ABOUT PSI CHI
Psi Chi is the International Honor Society in Psychology, founded in 1929 for the purposes of encouraging, stimulating, and maintaining excellence in scholarship, and advancing the science of psychology. Membership is open to graduate and undergraduate men and women who are making the study of psychology one of their major interests and who meet the minimum qualifications. Psi Chi is a member of the Association of College Honor Societies (ACHS) and is an affiliate of the American Psychological Association (APA) and the Association for Psychological Science (APS). Psi Chi's sister honor society is Psi Beta, the national honor society in psychology for community and junior colleges.

Psi Chi functions as a federation of chapters located at over 1,100 senior colleges and universities in the U.S., Canada, and Ireland. The Psi Chi Central Office is located in Chattanooga, Tennessee. A Board of Directors, composed of psychology faculty who are Psi Chi members and who are elected by the chapters, guides the affairs of the organization and sets policy with the approval of the chapters.

Psi Chi serves two major goals—one immediate and visibly rewarding to the individual member, the other slower and more difficult to accomplish, but offering greater rewards in the long run. The first of these is the Society's obligation to provide academic recognition to its inductees by the mere fact of membership. The second goal is the obligation of each of the Society's local chapters to nurture the spark of that accomplishment by offering a climate congenial to its creative development. For example, the chapters make active attempts to nourish and stimulate professional growth through programs designed to augment and enhance the regular curriculum and to provide practical experience and fellowship through affiliation with the chapter. In addition, the organization provides programs to help achieve these goals including regional and Society conventions, research award and grant competitions, certificate recognition programs, chapter awards, and Society service projects.

INSTRUCTIONS FOR CONTRIBUTORS
Submissions are accepted for review on an ongoing basis. Although manuscripts are limited to empirical research, they may cover any topical area in the psychological sciences.

1. A cover letter that includes the following:
   • Identifying information for the primary author, including an electronic mailing address;
   • The primary author’s Psi Chi membership ID number;
   • A description of the primary author’s educational status (e.g., an estimated or actual date of graduation, or description of faculty appointment);
   • A statement that the manuscript is original (not published or accepted for publication elsewhere);
   • A statement that the research was carried out with approval of an institutional review board and following proper procedures for the protection of human participants or animal subjects.

2. Sponsoring statement (undergraduate first authors only)
   • For undergraduate students, faculty mentors must provide a sponsoring statement that specifies:
     • The research adhered to APA ethical standards;
     • The mentor has read and critiqued the manuscript on content, method, APA style, grammar, and overall presentation and mentor, affirming that it is high-level, quality work; and
     • The planning, execution, and writing of the manuscript represent primarily the work of the undergraduate student.

3. Cover page
   • Cover page in APA style (with manuscript title, authors’ names, institutional affiliations, and possibly an author note).

4. A masked manuscript following these guidelines:
   • All authors’ identifying information (e.g., name and school) is removed from all sections of the entire manuscript. This information should be submitted in a separate cover page (see item #5 above).
   • The manuscript is in Microsoft Word.
   • The manuscript includes figures, tables, and charts generated in either Microsoft Word or Excel.
   • Scanned images or illustrations must have a resolution of at least 600 dpi resolution.
   • Authors must check for APA style.

The Influence of Perceived Familial Emotional Support in Childhood on Adult Health-Related Behaviors
Adriana Maldonado and Allison A. Vaughn
San Diego State University

Influence of Taste Quality on Affective State
Alexander B. Swan, Avichg Cohen, Samantha R. Evans, and Barbara A. Drescher
California State University, Northridge

Development of Child Attachment in Relation to Parental Empathy and Age
Katelyn R. Black and Jennifer P. Leszczynski
Eastern Connecticut State University

Connecting Gender and Mental Health to Imposter Phenomenon Feelings
Claire E. Cusack, Jennifer L. Hughes, and Nadi Nuhu
Agnes Scott College

Facial Expression: The Ability to Distinguish Between Enjoyment and Nonenjoyment Smiles
Spencer A. Coffman
Minnesota State University Moorhead

Awards and Grants Overview
According to the World Health Organization (WHO, 2011), the U.S. population’s life expectancy increased an average of two years from 2000 to 2009. Specifically, men’s life expectancy changed from 74 years in 2000 to 76 years in 2009, while women’s life expectancy increased from 80 years in 2000 to 81 years in 2009 (WHO, 2011). Along with this increase in life expectancy (i.e., mortality), prevalence rates of chronic diseases (i.e., morbidity) have also escalated. For example, during the last 20 years, diabetes prevalence rates have increased from 8% in 1988–1994 to 11% in 2005–2008 with a noticeable increase among children and adolescents.

Obesity and being overweight have escalated; that is, from the total U.S. population in 2007, about two-thirds of adults were obese or overweight. Obese individuals are at a higher risk of developing heart disease, cancers, and having strokes. Risk factors for developing diabetes and obesity include diet and inadequate physical activity (National Center for Health Statistics, 2010). Morbidity and mortality rates are influenced by a variety of health-related behaviors that an individual can engage in, including health-preventing, health-promoting, and health-harming behaviors.

Health-preventing behaviors are behaviors intended to prevent disease or injury (e.g., physical activity). Health-promoting behaviors are behaviors undertaken to enhance or maintain health (e.g., healthy diet). Health-harming behaviors are behaviors that undermine or harm current or future health (e.g., cigarette smoking; Taylor, 2009a). In the United States, cigarette smoking is related to many preventable diseases and it is responsible for at least 20% of all cancer deaths (American Lung Association, 2011; Centers for Disease Control and Prevention, 2007). Although people are aware of the risks involved in cigarette smoking, it is still a common practice among the U.S. population. Most
adults know that they should engage in health-preventing and health-promoting behaviors and that they should not engage in health-harming behaviors, but statistics show adherence to these recommendations is low.

Given the important role that health-related behaviors play in individuals’ health status, the goal of the current study was to examine the role of self-efficacy, perceived familial emotional support, and culture as predictors of health-related behaviors. Starting with a more proximal predictor (i.e., self-efficacy) and working our way through to more distal predictors (familial support and culture), we review the literature and develop a theoretical model of how these variables work together to explain health-related behaviors.

**Self-Efficacy**

There is a link between self-efficacy and whether individuals engage in health-preventing, health-promoting, and health-harming behaviors. (Bandura, 1986, 1989; Du, Everett, Newton, Salamonson, & Davison, 2011; Perkins, Parzynski, Mercincavage, Conklin, & Fonte, 2012; Strecher, DeVellis, Becker, & Rosenstock, 1986). Self-efficacy has been defined as “people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (Bandura, 1994, p.1).

Self-efficacy has been conceptualized as being comprised of two parts: efficacy expectations and outcome expectations. Efficacy expectations refer to beliefs about one’s capability in performing behaviors that would lead to a desired outcome. Outcome expectations are conceptualized as beliefs about whether those behaviors would lead to the desired outcome (Strecher et al., 1986). In the context of smoking cessation, these concepts would translate into an individual who possesses strong efficacy expectations (“Yes, I can stop”) and strong outcome expectations (“By using nicotine patches, I will be able to stop smoking cigarettes”). In addition, it has been documented that individuals with high levels of self-efficacy are more likely to seek preventative care, exercise more, and overcome addictions such as smoking (Bandura, 1986; Gecas, 1989). Similarly, Jackson, Tucker, and Herman (2007) found a positive relationship between having a health-promoting lifestyle (e.g., regular physical activity and balanced diet) and health self-efficacy.

Previous studies have documented that self-efficacy starts to develop through early life experiences as childhood is a crucial stage in the development of social competencies (e.g., self-efficacy; Mallinckrodt, 1992). According to Shaw, Krause, Chatters, Connell, and Ingersoll-Dayton (2004), the parent-child relationship serves as the context in which children learn important health-enhancing, social, and psychological tasks. That is, parents are regarded by children as models and, at the same time, they provide guidance, direct instructions, and teaching (Stack, Serbin, Enns, Ruttle, & Barrieau, 2010). Likewise, Mallinckrodt (1992) argued that having emotionally responsive parents during early development plays a critical role in the development of social competencies. He found a strong relationship between parental care bonds and self-efficacy. That is, when parents showed high levels of emotional responsiveness and were warm and nurturing, their children developed a stronger sense of self-efficacy.

**Perceived Familial Support**

During the early years of a child’s life, family is a key factor in the development and maintenance of self-efficacy, but at the same time the family provides children with social support. Social support is defined as “information from others that one is loved and cared for, esteemed and valued, and part of a network of communication and mutual obligations” (Taylor, 2009b, p.187). Distinctions have been made between received and perceived social support. In his meta-analysis, Barrera (1986) defined received social support as “actions that others perform when they render assistance to a focal person” (p. 417) and perceived social support as “the cognitive appraisal of being reliably connected to others” (p. 416). Social support has also been divided into subtypes which include, instrumental, appraisal, informational, and emotional support (Weiss, 1974). Instrumental support refers to help, aid, or assistance with tangible needs. Appraisal support relates to help in decision-making, giving appropriate feedback, or help deciding which course of action to take. Informational support is related to providing advice or information in the service of particular needs (Berkman, Glass, Brissette, & Seeman, 2000). Emotional support refers to an expression of care, concern, love, and interest, especially during times of stress or upset (Burleson, 2003). A plethora of past research has documented that social support is a good predictor of physical and psychological health (Russek & Schwartz, 1997; Strine, Chapman, Balluz, & Mokdad, 2008).
In his review, Cohen (1988) noted that the mere perception that social support is available is the primary cause of stress-buffering effects. That is, perceived social support protects individuals from the harmful effects that stress has on health, such as disruptions of neuroendocrine or immune system (Cohen & Wills, 1985) leading to a decrease in morbidity and mortality rates. More specifically, Berkman, Vaccarino, and Seeman (1993) suggested that emotional support was critical for the maintenance of health and wellbeing. In their meta-analysis, Uchino, Cacioppo, and Kiecolt-Glaser (1996) found that emotional support was linked to health benefits across a number of physiological systems including the cardiovascular and immune systems. Similarly, a myriad of research proposes that emotional support is associated with a reduced risk of mental and physical illness (i.e., morbidity) as well as mortality (Hale, Hannum, & Espelage, 2005). Examining the relationship between emotional support and health behaviors in the context of development, researchers have found that emotional support received from parents during childhood has long-term health consequences and a positive effect on the initiation and maintenance of health behaviors (Repetti, Taylor, & Seeman, 2002; Shaw, Krause, Chatters, Connell, & Ingersoll-Dayton, 2003; Strine et al., 2008). However, social support does not happen without context. Familial emotional support is perceived in the context of the larger culture in which it occurs.

Culture

Culture can be defined as “any kind of information that is acquired from other members of one’s species through social learning that is capable of affecting an individual’s behaviors” (Heine, 2008, p. 3). One common way of conceptualizing culture is in terms of individualism and collectivism. Individualistic cultures value autonomy of the self and the pursuit of individual goals rather than collective goals. On the other hand, collectivist cultures promote group membership from which individuals would receive protection (Oettingen, 1995; Triandis, 2009). These cultural dimensions can be further categorized as either having a horizontal or vertical orientation (i.e., horizontal and vertical individualism, horizontal and vertical collectivism). The horizontal orientation of both cultural dimensions emphasizes equality, whereas the vertical orientation acknowledges the existence of social inequalities or hierarchies. That is, in horizontal collectivism group membership is highly valued and all members of the group are seen as equal, whereas in vertical collectivism group inequalities exist because of the hierarchical structure. Similarly, horizontal individualism promotes autonomy and equality whereas in vertical individualism inequality exists (Singelis, Triandis, Bhawuk, & Gelfan, 1995).

In accordance with the aforementioned characteristics of individualism and collectivism, one could expect that the provision and perception of social support might differ in individuals depending on the cultural dimension with which they identified. Beehr and Glazer (2001) concluded that the perception of social support differs depending on the country of origin. That is, whether an individual receives, accepts, and perceives social support (instrumental, appraisal, informational, and emotional) would be dictated by culture. Goodwin and Hernandez-Plaza (2000) showed that collectivism was predictive of greater perceived familial support compared to individualism. Similarly, individualism and collectivism differ in their use of social network structures. People from individualistic cultures are less likely to rely on family as a source of support and more likely to look for nonfamily support sources (Kim & McKenry, 1998). Contrary to this, people from collectivistic cultures tended to rely on similar social network structures such as kin and nuclear family (Brown & Gary, 1987; Harrison, Wilson, Pine, Chan, & Buriel, 1990; Kim & McKenry, 1998; Taylor & Chatters, 1986; Vega, 1990).

Given our social nature, cultural patterns account for some of the variation perceived in people’s behaviors. Several scholars have pointed out that health behavior is highly influenced by cultural norms and expectations (Albrecht, 1994; Albrecht & Goldsmith, 2003; Bandura, 2002, 2004). For example, adopting collectivistic values has been associated with a lower tendency to smoke, drink alcohol, or use marijuana and favorable health behaviors patterns (Pikó, 2005; Pikó & Keresztes, 2006). In line with this argument, Unger et al. (2002) proposed that traditional cultural values such as collectivism, filial piety, and familism might work as protective agents against health-harming behaviors.

Present Study

Pulling together the aforementioned literatures, the main purpose of the current study was to identify the role that self-efficacy, perceived familial
emotional support, and culture (e.g., collectivism) played in predicting health-related behaviors (preventing, promoting, and harming) of college students (see Figure 1). In line with previous research, a number of hypotheses were tested. Hypothesis 1 predicted that individuals with higher levels of self-efficacy would report engaging in more health-promoting and health-preventing behaviors and fewer health-harming behaviors than individuals with lower levels of self-efficacy. Hypothesis 2 predicted that individuals with higher perceived familial emotional support during childhood would have higher levels of self-efficacy and would report engaging in more health-promoting and health-preventing behaviors and fewer health-harming behaviors. Furthermore, self-efficacy was predicted to mediate the relationship between perceived familial emotional social support and health-related behaviors (Hypothesis 2a). Hypothesis 3 predicted that individuals with high collectivistic values would perceive higher levels of familial emotional support during childhood and would report engaging in more health-promoting and health-preventing behaviors and in fewer health-harming behaviors. Additionally, familial emotional support was predicted to mediate the relationship between collectivism and health-related behaviors (Hypothesis 3a).

**Method**

**Participants and Procedures**

A total of 297 (69 men, 228 women) undergraduate students completed the survey. The sample age ranged from 18 to 38 years with a mean of 18.08 years ($SD = 1.85$). With regard to ethnicity, 133 (45.3%) identified as White American, 64 (21.5%) identified as Asian American, and 43 (14.5%) identified as Hispanic/Latino American. About half of the participants reported having a household income above $50,000, and the majority of participants reported having two parents/guardians at home during their childhood and access to health care. Refer to Table 1 for detailed demographics of the current sample.

After obtaining IRB approval (vIRB Number: 740080) participants were recruited through a psychology participant pool and were offered course credit for their introductory psychology course. The voluntary nature of participation was emphasized throughout the study by telling participants that they could stop responding to the survey at any time if they did not wish to continue. All of the participants completed all portions of the study.

**Measures**

Participants completed a paper and pencil questionnaire that measured the following constructs of interest: health-related behaviors, self-efficacy, perceived familial emotional support during childhood, collectivism and individualism, and demographic characteristics.

**Health-related behaviors.** A total of 21 items was used to measure the frequency with which participants engaged in health-related behaviors, with the ultimate goal of measuring a variety of behaviors with a relatively short number of items. Fifteen of these items were from the Multidimensional Health Behaviors Inventory (Kulbok, Carter, Baldwin, Gilmartin, & Kirkwood, 1999) to assess the exercise, stress/rest, checkup, cigarette use, and diet related health behaviors. The remaining six items were from the Adolescent Health Promotion Scale (Chen, Wang, Yang, & Liou, 2003) to assess health-responsibility and nutrition behavior. Statements such as the following were part of the scale: “How often do you limit fat in diet?” and “How often do you smoke cigarettes daily.” Items were rated on a 5-point Likert-type scale ranging from (1) never to (5) always. Items were combined to make three subscales: health-preventative behaviors ($\alpha = .67$), which included health-responsibility, stress/rest, and checkup; health-promoting behaviors ($\alpha = .75$), which included nutritional behavior, exercise, and diet; and health-harming

![FIGURE 1](image-url)
behaviors ($\alpha = .72$), which was limited to cigarette smoking. Following established guidelines, subscale scores were computed by summing the items. Higher scores indicated more engagement in health-preventative, health-promoting, and health-harming behaviors. Alpha coefficients were acceptable for the health-promoting and health-harming subscales, but were low for the health-promoting subscale. This is discussed in more detail in the discussion section.

**Self-efficacy.** Borrowing from the work of Grembowski et al. (1993) self-efficacy was measured through 10 items assessing participants’ perceptions of their ability to perform a specific health-related behavior successfully. The first five items measured individuals’ efficacy expectations which yielded a low alpha coefficient for the current sample ($\alpha = .67$). A sample item reads “How sure are you that you will exercise regularly during the next year?” Responses were measured through the use of a 10-point scale ranging from (0) not at all sure to (10) very sure. The last five items measured participants’ outcome expectations that yielded an acceptable alpha coefficient for the current sample ($\alpha = .73$). A sample item reads “Do you believe smoking cigars, cigarettes, or a pipe is harmful to your health?” Items were measured using a 10-point scale ranging from (0) not at all harmful to (10) very harmful. In accordance to the guidelines established by Grembowski et al. (1993), the mean score for each subscale (efficacy expectations and outcome expectations) was computed; higher scores indicated more self-efficacy.

**Perceived familial emotional support.** A total of six items were used to assess the level of perceived familial emotional support during childhood. Items were taken from the work of Shaw et al. (2003). Participants were asked about general familial support, such as: “How much did your family understand your problems and worries?” Items were scored using a 4-point scale ranging from (1) not at all to (4) a lot. In accordance to established guidelines, a single score of emotional support was created by summing across all six emotional support items; higher scores indicated higher emotional support ($\alpha = .85$ for the current sample).

**Collectivism and individualism.** A total of 29 items (INDCOL; Singelis et al., 1995) were used to measure participants’ level of vertical individualism, horizontal individualism, vertical collectivism and horizontal collectivism. Statements such as the following were part of the scale: “It annoys me when other people perform better than I do”, “I often do my own thing”, “I would do what would please my family, even if I detested that activity”, and “The well-being of my coworkers is important to me.” Responses were measured using a 9-point Likert-type scale ranging from (1) never or definitely no to (9) always or definitely yes. Following the guidelines

### TABLE 1
Demographic Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N = 297</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age: M (SD)</td>
<td>18.78(1.85)</td>
</tr>
<tr>
<td>Sex (%)</td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td>76.8</td>
</tr>
<tr>
<td>Men</td>
<td>23.2</td>
</tr>
<tr>
<td>Ethnicity (%)</td>
<td></td>
</tr>
<tr>
<td>White American</td>
<td>44.8</td>
</tr>
<tr>
<td>Asian Americans</td>
<td>21.5</td>
</tr>
<tr>
<td>Hispanic/Latino American</td>
<td>14.5</td>
</tr>
<tr>
<td>Relationship Status (%)</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>65.7</td>
</tr>
<tr>
<td>Married</td>
<td>0.7</td>
</tr>
<tr>
<td>In a Relationship</td>
<td>33.3</td>
</tr>
<tr>
<td>Income (%)</td>
<td></td>
</tr>
<tr>
<td>Under $10,000</td>
<td>14.8</td>
</tr>
<tr>
<td>$10,001–20,000</td>
<td>7.1</td>
</tr>
<tr>
<td>$20,001–30,000</td>
<td>7.4</td>
</tr>
<tr>
<td>$30,001–40,000</td>
<td>9.1</td>
</tr>
<tr>
<td>$40,001–50,000</td>
<td>13.5</td>
</tr>
<tr>
<td>Over $50,000</td>
<td>44.1</td>
</tr>
<tr>
<td>Parental Education (%)</td>
<td></td>
</tr>
<tr>
<td>Below Grade 8</td>
<td>3.7</td>
</tr>
<tr>
<td>Grade 8 Completed</td>
<td>1.0</td>
</tr>
<tr>
<td>Some High School</td>
<td>4.4</td>
</tr>
<tr>
<td>High School Graduate</td>
<td>11.1</td>
</tr>
<tr>
<td>Some College</td>
<td>20.2</td>
</tr>
<tr>
<td>College Graduate</td>
<td>35.4</td>
</tr>
<tr>
<td>Advanced Degree</td>
<td>23.2</td>
</tr>
<tr>
<td>Number of Parents/Guardians at Home During Childhood (%)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>15.5</td>
</tr>
<tr>
<td>2</td>
<td>80.5</td>
</tr>
<tr>
<td>English Primary Language Spoken at Home (%)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>81.1</td>
</tr>
<tr>
<td>No</td>
<td>18.9</td>
</tr>
<tr>
<td>Health Care Access (%)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>94.6</td>
</tr>
<tr>
<td>No</td>
<td>5.1</td>
</tr>
</tbody>
</table>
established by Singelis et al. (1995), a score for each of the categories (vertical individualism, horizontal individualism, vertical collectivism, and horizontal collectivism) was computed by summing the items in each category. A high score indicated higher levels of vertical individualism, horizontal individualism, vertical collectivism, and horizontal collectivism. The four subscales had acceptable internal consistency values for the current sample, with alphas ranging from .74 to .85.

Results

Descriptive Statistics and Possible Covariates

Table 2 presents the means, standard deviations, and zero-order correlations for all of the variables of interest (i.e., health behaviors, self-efficacy, perceived familial emotional support, and culture). Overall, our sample reported an average engagement of health-promoting, health-preventing, and health-harming (i.e., smoking) behaviors. They also reported high levels of perceived familial emotional support and average levels of self-efficacy. Prior to hypothesis testing, demographic characteristics were tested as possible covariates for all variables of interest. Correlations were used to test continuous variables (e.g., age), and t-tests and F-tests were used to test categorical variables (e.g., ethnicity).

Ethnicity, parents’ education, and English spoken in the home were significantly related to health-preventing behaviors (p < .05) such that more health-preventing behaviors were reported by participants who were White American, (relative to Asian Americans; F[2, 237] = 3.08), had parents with higher levels of education (r = .13), and spoke English in the home (t[295] = -2.60). These demographic characteristics along with household income also significantly related to health-promoting behaviors (p < .05). Specifically, more health-promoting behaviors were reported by participants who were White American (relative to both Hispanics and Asian Americans; F[2, 237] = 7.34), had higher household incomes (r = .17), had parents who had higher levels of education (r = .17), and spoke English in the home (t[295] = -2.78). Additionally, sex, ethnicity, and English spoken in the home were significantly related (p < .05) to health-harming behaviors, such that more smoking was reported by men (t[295] = -2.64), Asian American participants (relative to both White Americans and Hispanics; F[2, 237] = 3.90), and participants who did not speak English in the home (t[295] = 2.10). Sex was also significantly related to self-efficacy (p < .01) such that women perceived higher levels of both efficacy (t[295] = 3.21) and outcome expectations (t[295] = 3.98) compared to men. Finally, ethnicity, household income, access to health care, parents’ education, having two parents in the home as child, and English spoken in the home were significantly related to perceived familial emotional support during childhood, (ps < .05). Specifically, higher levels of perceived familial emotional support during childhood were reported by participants who were White American or Hispanic/Latino American (relative to Asian Americans; F[2, 236] = 14.88), had higher household incomes (r = .28), and greater access to health care (t[293] = -2.39), had parents who had higher levels of education (r = .15), reported having two parents (relative to one parent) in the home as a child (t[282] = -5.37), and spoke English in the home (t[294] = -1.99). Given these significant relationships found between the participants’ demographic characteristics and other variables assessed, the demographic variables were entered into Step 1 of subsequent regression analyses to control for their effects.

Self-Efficacy and Health-Related Behaviors

Hierarchical linear regressions were employed to test all hypotheses. Hypothesis 1 proposed that higher levels of self-efficacy would be related to

<table>
<thead>
<tr>
<th>TABLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means, Standard Deviations, and Zero-Order Correlations of All Scales</td>
</tr>
<tr>
<td>Scale</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>1. Health-Promoting</td>
</tr>
<tr>
<td>2. Health-Promoting</td>
</tr>
<tr>
<td>3. Health-Harming</td>
</tr>
<tr>
<td>4. Familial Emotional Support</td>
</tr>
<tr>
<td>5. Outcome Expectations</td>
</tr>
<tr>
<td>6. Efficacy Expectations</td>
</tr>
<tr>
<td>7. Vertical Individualism</td>
</tr>
<tr>
<td>8. Horizontal Individualism</td>
</tr>
<tr>
<td>9. Vertical Collectivism</td>
</tr>
<tr>
<td>10. Horizontal Collectivism</td>
</tr>
</tbody>
</table>

*Correlation is significant at the .05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).
more health-promoting and health-preventing and fewer health-harming behaviors. The covariates discussed above were entered into the first step, and self-efficacy (both efficacy and outcome expectations) was entered in Step 2. Table 3 displays the unstandardized regression coefficients (B), the standard error of B, and the standardized regression coefficients (β), $R^2$ and $\Delta R^2$ after entry of all independent variables. The overall regression coefficient was significantly different from zero for each model. Model 1 showed that efficacy expectations were a significant predictor of health-preventing behaviors, $F(6, 287) = 6.99$, $p < .001$, $R^2 = .13$. Even after controlling for ethnicity, parental education, and English spoken at home, higher efficacy expectations were related to more health-preventing behaviors. Model 2 showed that efficacy expectations were a significant predictor of health-promoting behaviors, $F(7, 275) = 23.91$, $p < .001$, $R^2 = .38$. Even after controlling for ethnicity, household income, parental education, and English spoken at home, higher efficacy expectations were related to more health-promoting behaviors. Finally, Model 3 showed that efficacy expectations were a significant predictor of health-harming behaviors, $F(6, 290) = 9.52$, $p < .001$, $R^2 = .17$. Even after controlling for sex, ethnicity, and English spoken at home, higher efficacy expectations were related to fewer health-harming behaviors. Across all three models, efficacy expectations were related to better health-related behaviors, whereas outcome expectations were not significantly related to any health-related behaviors.

**Childhood Familial Emotional Support, Self-Efficacy, and Health-Related Behaviors**

Hypothesis 2 proposed that the higher people perceived their familial emotional support during childhood, the higher their level of self-efficacy would be in adulthood. The covariates discussed above were entered into the first step, and perceived familial emotional support was entered in Step 2 of the regression model. Table 4 displays the unstandardized regression coefficients (B), the standard error of B, standardized regression coefficients (β), $R^2$ and $\Delta R^2$ after entry of all independent variables. The overall regression coefficient was significantly different from zero for the model. Perceived familial emotional support was a significant predictor of efficacy expectations, $F(2, 293) = 17.62$, $p < .001$, $R^2 = .11$. After controlling for gender, higher perceived familial emotional support was related to higher efficacy expectations. Perceived familial emotional support was also a significant predictor of outcome expectations, $F(2, 293) = 14.95$, $p < .001$, $R^2 = .09$. Even after controlling for sex, higher perceived familial emotional support was related to higher outcome expectations.

It was also proposed in Hypothesis 2 that the higher people perceived their familial emotional

![Table 3](image_url)

**Table 3**

Regression Models Predicting Health-Preventing, Health-Promoting, and Health-Harming Behaviors From Self-Efficacy ($N = 297$)

<table>
<thead>
<tr>
<th>Model 1: Health-Preventing Behaviors</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>$R^2$</th>
<th>$\Delta R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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*Note:* $^*p < .05$, $^**p < .01$. 
support during childhood, the more they would engage in health-promoting and health-preventing behaviors and the less they would engage in health-harming behaviors. Covariates were entered into the first step, and perceived familial emotional support was entered in Step 2 of the regression model. Table 5 displays the unstandardized regression coefficients (B), the standard error of B, standardized regression coefficients (β), $R^2$, and $ΔR^2$ after entry of all independent variables. The overall regression coefficient was significantly different from zero for each model. Model 1 showed that perceived familial emotional support was a significant predictor of health-preventing behaviors, $F(5, 287) = 6.39, p < .001, R^2 = .10$. Even after controlling for ethnicity, parental education, and English spoken at home, higher perceived familial emotional support was related to more health-preventing behaviors. Model 2 showed that perceived familial emotional support was a significant predictor of health-promoting behaviors $F(6, 275) = 7.13, p < .001, R^2 = .14$. Even after controlling for ethnicity, household income, parental education, and English spoken at home, higher perceived familial emotional support was related to more health-promoting behaviors. Finally, Model 3 showed that perceived familial emotional support was a significant predictor of health-harming behaviors, $F(5, 290) = 4.44, p < .001, R^2 = .07$. Even after controlling for sex, ethnicity, and English spoken at home, higher perceived familial emotional support was related to fewer health-harming behaviors. Across all three models, perceived familial emotional support was related to better health-related behaviors.

The Mediating Effects of Self-Efficacy
Hypothesis 2a proposed that self-efficacy would mediate the relationship between perceived familial emotional support and health-related behaviors. To test formally for mediation, the Baron and Kenny (1986) approach was used. The preceding analyses have already established that perceived familial emotional support was associated with efficacy expectations (Step 1 of Baron and Kenny).

### TABLE 5
Regression Model Predicting Health-Preventing, Health-Promoting, and Health-Harming Behaviors From Perceived Familial Emotional Support ($N = 297$)

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<tr>
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Note. *p < .05, **p < .01.
and health-related behaviors (Step 2 of Baron and Kenny). These findings establish the necessary criteria to test whether the perceived familial emotional support-health-related behavior relationship is mediated by self-efficacy. In addition to the relationships established above, one additional regression model was examined to test whether health-related behaviors can be explained by perceived familial emotional support and self-efficacy simultaneously (Step 3 of Baron and Kenny). These analyses revealed that the relationship between perceived familial emotional support and health-related behaviors was mediated by self-efficacy. As Figure 2 shows, the standardized coefficient beta ($\beta$) decreased in all three models of health-related behaviors when controlling for self-efficacy. Furthermore, a formal test of mediation was conducted by calculating the 95% confidence limits for the indirect effects of each model using PRODCLIN (MacKinnon, Fritz, Williams, & Lockwood, 2007): 0.06827 and 0.26938 for health-preventing, 0.14745 and 0.36828 for health-promoting, and -0.11899 and 1.03951 for health-harming. The first two were consistent with statistically significant mediated effects because the confidence limits did not contain zero (MacKinnon et al., 2007); however, this was not the case for health-harming behaviors (as the confidence limit did contain zero).

**Culture, Childhood Familial Emotional Support, and Health-Related Behaviors**

Hypothesis 3 proposed that people with high collectivistic values would perceive higher levels of familial emotional support during childhood. Covariates were entered into Step 1 of the regression model, and cultural variables (vertical and horizontal individualism and collectivism) were entered in Step 2. Table 6 displays the unstandardized regression coefficients (B), the standard error of B, standardized regression coefficients ($\beta$), $R^2$, and $\Delta R^2$ after entry of all independent variables. The overall regression coefficient was significantly different from zero for the model. Collectivism (horizontal) was a significant predictor of perceived familial emotional support, $F(11, 209) = 11.67, p < .001, R^2 = .30$. Even after controlling for ethnicity, household income, parental education, English spoken at home, number of parents in the home as a child, and access to health care, higher collectivism was related to higher levels of perceived familial emotional support.

It was also proposed in Hypothesis 3 that people with high collectivistic values would report engaging in more health-promoting and health-preventing behaviors and in fewer health-harming behaviors. Covariates were entered into Step 1, and cultural variables were entered into Step 2 of the regression model. Table 7 displays the unstandardized regression coefficients (B), the standard error of B, standardized regression coefficients ($\beta$), $R^2$, and $\Delta R^2$ after entry of all independent variables. The overall regression coefficient was significantly different from zero for each model. Model 1 showed that collectivism (horizontal) was a significant predictor of health-preventing behaviors, $F(8, 284) = 4.17, p < .001, R^2 = .09$. Even after controlling for ethnicity, parental education, and English spoken at home, higher collectivism was related to more health-preventing behaviors. Model 2 showed that collectivism (horizontal) was a significant predictor of health-promoting behaviors $F(9, 273) = 5.36, p < .001, R^2 = .14$. Even after controlling for ethnicity, household income, parental education, and English spoken at home, higher collectivism was related to more health-promoting behaviors. Finally, Model 3 showed that collectivism (horizontal) was
a significant predictor of health-harming behaviors, $F(8, 287) = 3.95$, $p < .001$, $R^2 = .09$. Even after controlling for sex, ethnicity, and English spoken at home, higher collectivism was related to fewer health-harming behaviors. Across all three models, collectivism was related to better health-related behaviors.

The Mediating Effects of Childhood Familial Support

Hypothesis 3a proposed that perceived familial emotional support would mediate the relationship between collectivism and health-related behaviors. To test formally for mediation, the same Baron and Kenny (1986) approach was used. The preceding analyses have already established that collectivism was associated with perceived familial emotional support (Step 1 of Baron and Kenny) and health-related behaviors (Step 2 of Baron and Kenny). One additional regression model was examined to test whether health-related behaviors can be explained by collectivism and perceived familial emotional support simultaneously (Step 3 of Baron and Kenny). These analyses revealed that the relationship between and health-related behaviors was mediated by perceived familial emotional support. As Figure 3 shows, the standardized coefficient beta ($\beta$) decreased in all three models of health-related behaviors when controlling for perceived familial emotional support. Furthermore, a formal test of mediation was conducted by calculating the 95% confidence limits for the indirect effects of each model using PRODCLIN (MacKinnon et al., 2007): $0.029361$ and $0.13610$ for health-preventing, $0.02768$ and $0.10466$ for health-promoting, and $-0.03298$ and $-0.00070$ for health-harming. These were all consistent with existing research in which a positive relationship between self-efficacy and health-preventing and health-promoting behaviors has been identified (Steptoe, Perkins-Porras, Rink, Hilton, & Capuccio, 2003; Wojciechowski, Hurtig, & Dorn, 2002). With respect to health-harming behaviors, several researchers have reported that high levels of self-efficacy are associated with smoking cessation (Bandura, 1986, 1989; Gecas, 1989; Strecher et al., 1986). In the current study, only efficacy expectations (and not outcome expectations) were related to health-related behaviors. Distinctions

Discussion

Given the importance of health-related behaviors on individuals’ health status, the current study sought to identify the role that self-efficacy, perceived familial emotional support, and culture (e.g., collectivism) played in predicting health-related behaviors (preventing, promoting, and harming) of college students (see Figure 1). Consistent with proposed hypotheses, higher self-efficacy, perceived familial emotional support, and collectivism were related to participants engaging in more healthy behaviors. Furthermore, mediation analyses provided initial evidence for our proposed model: 1) perceived familial emotional support is one explanatory link between culture and health-related behaviors, and 2) self-efficacy is one explanatory link between perceived familial emotional support and health-related behaviors.

Self-Efficacy and Health-Related Behaviors

The results of the present study showed that as individuals’ self-efficacy increased their health-preventing and health-promoting behaviors increased, but their health-harming behaviors decreased. These findings are consistent with existing research in which a positive relationship between self-efficacy and health-preventing and health-promoting behaviors has been identified (Steptoe, Perkins-Porras, Rink, Hilton, & Capuccio, 2003; Wojciechowski, Hurtig, & Dorn, 2002). With respect to health-harming behaviors, several researchers have reported that high levels of self-efficacy are associated with smoking cessation (Bandura, 1986, 1989; Gecas, 1989; Strecher et al., 1986). In the current study, only efficacy expectations (and not outcome expectations) were related to health-related behaviors.

### TABLE 6
Regression Model Predicting Perceived Familial Emotional Support From Individualism and Collectivism ($N = 297$)

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<th>$\beta$</th>
<th>$R^2$</th>
<th>$\Delta R^2$</th>
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Note: * $p < .05$, ** $p < .01$. 

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are made between these two separate but related constructs. In order to reach a desired outcome (i.e., be healthy), a person must believe not only that they can do a specific behavior (i.e., “I can exercise regularly” or efficacy expectations) but also that the specific behavior is related to the desired outcome (i.e., “exercising regularly will improve my health” or outcome expectations). In this sample, outcome expectations were (on average) higher than efficacy expectations and also had less variability (see Table 2). Moreover, it could be the case that what we know is good and bad for us does not necessarily map on to our behaviors. That is, college students’ health-related behaviors might be more influenced by the perception of skills needed to be healthy adults and less by what behaviors actually make you healthy.

**Childhood Familial Emotional Support, Self-Efficacy, and Health-Related Behaviors**

As hypothesized, perceived familial emotional support was found to be positively associated with self-efficacy. According to Strecher et al., (1986) and Oettingen (1995), there are multiple sources of information needed to build self-efficacy and familial emotional support could influence the development of self-efficacy in a variety of ways. Vicarious experience refers to learning through observation of models, and children are better observers than adults and tend to imitate the behaviors that are presented to them at a higher rate than adults (Chance, 2006). Thus, strong ties between children and the family give children access to a variety of adult models from which they can learn a variety of health-related behaviors. Verbal persuasion refers to messages of trustworthiness and expertise transmitted by parents to children, thereby increasing confidence in children at the time of performing a behavior. If children are encouraged when performing health-preventing and health-promoting behaviors, and discouraged when performing health-harming behaviors, their self-efficacy will be improved. Finally, an individual’s physiological state refers to physiological responses to stress, and familial emotional support could reduce these physiological stress responses by reframing adverse events into less threatening and promoting effective coping strategies (e.g., exercising rather than smoking; Cohen, 2004).

Further, perceived familial emotional support was found to be positively associated with health-preventing and health-promoting behaviors, and negatively associated with health-harming behaviors. The following table shows the regression models predicting health-preventing, health-promoting, and health-harming behaviors from individualism and collectivism (N = 297).
behaviors. These findings supported the hypotheses and are consistent with previous work (Shaw et al., 2004; Wickrama, Lorenz, & Conger, 1997) that has shown that having supportive parents during childhood is a good predictor of psychological and physical health. The parent-child relationship is crucial for the development of the child (Shaw et al., 2004), so when there are strong ties between parents and the child, the child successfully learns how to navigate in society through the modeling of the parents' behaviors. At the same time, this relationship positively affects the child’s ability to seek sources of social support later in life, which helps to promote health (Cobb, 1976). Likewise, as hypothesized, the relationship between perceived familial emotional support and health behaviors was mediated by self-efficacy. That is, familial emotional support may have helped to build self-efficacy, and that higher sense of efficacy may have led people to engage in healthier behaviors (i.e., more health-preventing and health-promoting, and fewer health-harming behaviors).

Culture, Childhood Familial Emotional Support, and Health-Related Behaviors

As hypothesized, collectivism was found to be positively associated with perceived familial emotional support during childhood. These findings are consistent with previous studies in which the adherence to collectivistic values such as “familism” was positively related to familial social support (Almeida, Molnar, Kawachi, & Subramanian, 2009; Moscardino, Scrimin, Capello, & Altoè, 2010). Collectivistic cultures tend to value group membership, and family is expected to foster membership, dependence, and loyalty to in-groups (Bumgardner, 1996; Oettingen, 1995). Thus, just by endorsing collectivistic values individuals are expected to favor family needs and conform to the values or norms practiced by the in-group in order to receive the support from the group (Moscardino et al., 2010).

Further, collectivism was found to be positively associated with health-preventing and health-promoting behaviors, and negatively associated with health-harming behaviors. Berkman et al. (2000) concluded that social networks (e.g., culture and family) have an effect on health through social support (e.g., emotional support), social influence, social engagement and attachment, and access to material resources. In the same lines, “culture-bound health promotion strategies” proposed that health-behaviors are better explained in terms of normative influence, social support, and social learning theory (Paek, Yu, & Bae, 2009). The role that social support plays in predicting health has already been established and some agree that it is a good predictor of physical and psychological health (Russek & Schwartz, 1997; Strine et al., 2008). Society has the power to influence individuals’ behaviors through norms. Collectivistic cultures benefit from norms that emphasize healthier behaviors and strong family support networks (Gorman, Ecklund, & Heard, 2010). For example, harmony values refer to an interdependent value that promotes conflict-free relationships (Chen & Chung, 1994). If cigarette smoking were seen as a deviant act by society, individuals high in collectivism would conform to subjective and social norms in order to maintain group harmony. In addition, collectivistic societies tend to give greater value to interactions within the group (Triandis, 1995). Failing to conform to societal norms would lead to isolation from the in-group resulting in a lack of social support or loneliness which had been found to be negatively associated with health outcomes (Cohen, 2004). Finally, the relationship between collectivism and health behaviors was mediated by perceived familial emotional support. That is,
collectivism provided a context with which to perceive higher levels of familial emotional support, which in turn related to engagement in healthier behaviors (i.e., more health-preventing and health-promoting and fewer health-harming behaviors).

Limitations, Future Research, and Implications

There were some limitations that should be noted when interpreting these results. Given that data were collected from undergraduate students, generalizations beyond that of college-aged adults should be done with caution. Future research should address this limitation by collecting data from a more representative sample with respect to age and geographic location. Because the study used a cross-sectional, correlational design, a causal model cannot be tested. Although the proposed model makes assumptions about temporal sequence (i.e., early emotional support influences adult health behaviors and not the other way around), all data were collected at a single point in time. Along those same lines, the measurement of familial emotional support during childhood was open to retrospective bias in memory and mood, as are most retrospective self-reports. Ideally longitudinal studies would measure emotional support in children and follow up years later to examine the effects on health behaviors; however, cost and attrition would be concerns for a study of this magnitude. Further, although instructions explicitly denoted that we were interested in the perception of familial emotional support during childhood, participants’ responses to the questionnaire could be biased by other means in which support was available to them (i.e., received). Future research should address this limitation by collecting data on both perceived and received familial emotional support. Another limitation is that the concept of family could have been misinterpreted by respondents. Even though the questionnaire instructions stated that for the purposes of the current study the term family referred to immediate and extended family (i.e., parents, siblings, grandparents, uncles, aunts, cousins, nephews and nieces), persons outside this description may have been included when answering these items. Future research could address this by having the participant list people who were present in their household as a child. Finally, the health-harming behaviors scale only measured cigarette smoking. Health-harming behaviors may have also included alcohol and substance use; however, asking these items posed more than “minimum risk” and were thus left out due to concerns raised by the IRB. Future studies may want to include more health-harming behaviors to get a better representation of this type of behaviors.

Despite these limitations, the current study contributes to the existing body of research in a number of ways. Given the multiculturalism that exists within the United States’ population, it is important to develop studies in which cultural diversity is taken into account. Having this in mind, the current study collected data from an ethnically diverse sample of college students. Moreover, we proposed a theoretical model explaining health-related behaviors where multiple levels of analysis are integrated. At the broadest level, culture (specifically collectivism) serves as the context in which familial emotional support during childhood could be perceived. At the next level, perceiving familial emotional support during childhood allows for the development of a stronger sense of self-efficacy within an individual. At the last level, high levels of self-efficacy allow individuals to engage in health-preventing and health-promoting behaviors and to avoid engaging in health-harming behaviors. The importance of this model lies in the fact that it provides multiple points for intervention for programs designed to increase the practice of healthy behaviors among college students. For example, clinicians in the student health center could focus on increasing efficacy for specific health behaviors whereas advisors in the residence halls could highlight the culturally relevant health norms of their students. Ultimately, these programs may help to reduce the prevalence rates of chronic diseases in the U.S. population.

References


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Familial Emotional Support | Maldonado and Vaughn


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Influence of Taste Quality on Affective State

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ABSTRACT. Much of the research exploring the relationship between taste quality and affective state suggests that sweet-tasting foods are associated with pleasant feelings, and sour- and spicy-tasting foods are associated with unpleasant feelings. The findings of arousal response as a component of overall affective state are less clear with respect to taste quality. The present study investigated the relationship between taste quality and affective state by comparing arousal and pleasantness ratings of neutral images from the International Affective Picture System (IAPS). Participants \((N = 55)\) recorded these ratings during consumption of sprays which varied in taste quality (sweet, sour, or spicy). As hypothesized, sweet sprays elicited significantly higher ratings of pleasantness than sour or spicy sprays \((\eta_p^2 = .14)\) on the neutral images. However, arousal ratings did not differ among the three taste quality conditions. Implications of the findings in a broader framework and suggestions for future research are discussed.

Taste quality is an important factor in dietary choice because it is an indication of nutritional content (Breslin & Spector, 2008). However, the mechanism that translates taste quality to the motivation to choose specific foods is not well understood and is just beginning to be discussed (Rolls, 2011). Since hunger is often accompanied by irritability and discomfort, it is no surprise that eating usually improves general mood (Gibson, 2006), but hunger cannot explain or predict the choice of one food over another, or whether the choice is a matter of taste or perceived caloric (nutritional) content. Associations of taste quality with emotion may be involved in dietary choices.

The effect of taste quality on emotion has been somewhat consistent in laboratory tests. Bitterness perception in humans is highly variable. For example, a group of randomly sampled individuals may perceive a bitter stimulus as either not at all bitter to highly bitter within the group, producing a range of reactions (Breslin & Spector, 2008). Sweet and sour substances induce facial expressions in both neonates and adults that are consistent with those recognized as joy and disgust, respectively, indicating a consistency of reactions across the life span and a randomly sampled group of people (Greimel, Macht, Krumhuber, & Ellgring, 2006; Steiner, 1974). Fox and Davidson (1986) found that newborns react more quickly to sour water than sweet water, that sweet water is accompanied by positive affect, and that sour water is accompanied by negative affect. Sweet flavors are rated higher in pleasantness than other flavors and may even increase pain tolerance (Kakeda & Ishikawa, 2011; Lewkowski, Young, Ghosh, & Ditto, 2008). Indeed, not even conditioned emotive responses can change affect felt while tasting a sweet drink (Kuenzel et al., 2010). It appears that the sweet-pleasantness link is only disrupted by the onset of acute stress (from self-report ratings), but quickly rebounds (Al’Absi, Nakajima, Hooker, Wittmers, & Cragin, 2012).

Neuroimaging research suggests that, although...
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Taste perception does not appear to be related to the dopamine-driven reward system in the brain (Yamamoto, 2006), motivations to acquire a sweet reward are mediated by this system relative to sucrose concentration—a testimony to the hedonic value of sweet taste. In addition, the amygdala is activated with both pleasant and unpleasant tastes (O’Doherty, Rolls, Francis, Bowtell, & McGlone, 2001), suggesting that the link between taste and emotion is not limited to positive affect (Francis et al., 1999).

Traditionally, there have been four basic tastes: sweet, sour, salty, and bitter (Hollingworth & Poffenberger, 1917; McBurney & Gent, 1979); in addition, the taste of monosodium glutamate, umami, has been included in some Asian cultures (Bellisle, 1999). However, complex flavors involving two or more receptors such as spicy (in which salty and sour flavors predominate) do not appear in the literature on emotion. Responses to the spiciness of various chemical agents (e.g., capsaicin or cinnamon) have been shown to operate independently of taste quality recognition (Cowart, 1987). In other words, the identification of the basic taste qualities can be performed even with oral irritation (burning or hotness). However, we could find no literature exploring the effects of this irritation on emotion, such as a comparison to that of sour or bitter tastes. “A mouth on fire” seems unpleasant, but this relationship should not be assumed and warrants investigation.

It is clear that humans find moderately sweet tastes pleasant (Breslin & Spector, 2008; Kakeda & Ishikawa, 2011; Lewkowski et al., 2008); however, inconsistencies in the definition and measurement of emotional responses are not easily reconciled. Although some facial expressions are universally understood to be responses of a given category (Ekman, 1999), this kind of measure provides no information about the intensity of emotional response. Physiological measures of arousal (Robin, Rousmans, Dittmar, & Vernet-Maury, 2003) have been translated into basic emotion categories, however, arousal is considered by some as a dimension of emotion that is independent of pleasantness (Lang, 1980; Lang, Bradley, & Cuthbert, 2008). For example, joy can be characterized by high pleasantness and high arousal, but rage is best described as low pleasantness and high arousal. These two dimensions are considered sufficient to describe emotional states (Lang, 1995).

To determine the effect of taste quality on affective state, we compared arousal and pleasantness (valence) ratings of neutral images from the International Affective Picture System (IAPS; Lang et al., 2008) in a between-subjects experiment. The IAPS is an image database for which normative values of affective ratings are available. Ratings of IAPS images serve as a reliable measure of emotional response (Lang, 1995; Lang et al., 2008). Limiting the stimuli to images considered neutral (i.e., with normed ratings limited to the middle range of both arousal and pleasantness scales) ensures that the stimuli are unlikely to evoke strong affective responses which could interact with the independent variable. Mean ratings of a single set of images are then compared across treatment conditions, providing an additional measure of effect size. For example, this method has been used to measure effects on emotion of instruction (Jackson, Malmstadt, Larson, & Davidson, 2000; Moser, Hajcak, Bukay, & Simons, 2006) and color (Drescher, 2004).

With the evidence presented above, we hypothesized that IAPS images would be rated highest in pleasantness and arousal by participants ingesting the sweet taste. It was predicted that the emotions felt when pleasantness and arousal were high (e.g., joy) would be linked to the hedonic value of sweet tasting foods (Breslin & Spector, 2008; Kakeda & Ishikawa, 2011; Lewkowski et al., 2008; Yamamoto, 2006). In contrast, we hypothesized sour tastes would be met with disgust (Steiner, 1974), which we predicted would lead to ratings low in pleasantness and arousal. Complex tastes such as spiciness have not been studied thoroughly, but if the reaction to these tastes involve pain sensation, then the ratings should be rather unpleasant. Furthermore, arousal to spicy tastes should be similar to sour tastes, such as a moderate desire to avoid that taste. Thus, we expected sour and spicy tastes to have equivalent ratings on the two scales. Overall, we expected the sweet taste to be higher than sour and spicy tastes on pleasantness and arousal, demonstrating an effect of taste quality on emotional response.

Method

Participants

Fifty-five undergraduate students enrolled in introductory psychology courses (subject pool) at California State University, Northridge participated to fulfill a course requirement. Participants were required to abstain from ingesting food approximately one hour prior to completing the task to ensure a cleansed palate. All participants met this requirement through a verbal check by the...
experimenter prior to going through informed consent. Demographic information of the participants, such as age and sex, was not recorded.

An intended sample size of 25 participants per group was desired for adequate power (.70) in this between-subjects design; however, due to limited resources, this was not possible during the experimentation phase, and group sizes had to be truncated. However, the relatively simple nature of the design is generally robust to this sample size and power issue.

Institutional Review Board (IRB) approval was granted prior to collecting data for the study. Each participant gave signed informed consent prior to beginning the study and ingesting the experimental stimulus.

**Design and Materials**

**Flavor sprays.** Taste quality served as the independent variable with three levels: sweet, sour, and spicy. Liquid candies in individual 0.125 ounce spray bottles were used to ensure consistency of texture and intensity, and chosen by agreement of the four authors to ensure expression of the desired taste quality. As far as the authors were aware, this was the first use of these sprays in an experimental setting. The sprays used were Too Tart® Super Sweet Strawberry for sweet, Mega Warheads® Sour Blue Raspberry for sour, and Mike and Ike® Hot Tamales Cinnamon for spicy. Labels were removed from the containers to prevent knowledge of the taste quality prior to the procedure.

**Scales.** Pleasantness (valence) and arousal ratings served as dependent variables measured on 9-point scales and illustrated by the Self-Assessment Manikin (SAM; Lang, 1980, 1995; Lang et al., 2008). Each SAM scale was pictographic, culture-free, and could be rapidly administered. The SAM was anthropomorphic with a head, face, torso, arms and legs. The pleasantness scale was described as ranging from extremely unhappy (1) to extremely happy (9). Likewise, the arousal scale was described as ranging from extremely calm (1) to extremely excited (9) with a typical (neither happy nor unhappy; neither calm nor excited) state rated 5. Additionally, for the pleasantness scale, the face of the SAM changed from a frowning, sad facial expression on the low end, to a midpoint of a flat facial expression, and at the high end, displays a smiling facial expression. For the arousal scale, the SAM displayed a starburst design in the torso area with increasing size as arousal/excitement increased. Each scale was identical to those used to develop the IAPS.

While the numbers on the scale were used as the dependent variables (DVs), the SAM was merely used to give a visual representation of the scale values to the participants.

**Images.** Twenty-five images from the International Affective Picture System (IAPS; Lang et al., 2008) were chosen based on normed ratings of arousal and valence. Images had ratings between 3.5 and 6.5 on both the pleasantness and arousal scales. This range provided images with neutral affective content, such as a towel or a hammer without context. They were displayed, along with SAM illustrations, on personal computers using SuperLab 4.0 software.

**Procedure**

Prior to participation in the experiment, participants were required to refrain from eating for at least one hour. The experiment took place in a quiet cubicle with the personal computer in one corner. Upon entering the cubicle, participants were randomly assigned to one of the three taste quality conditions and given an informed consent form to sign. The only information given to participants was that they would be ingesting flavored liquid and rating images. No experimental purpose was described. Prior to the experimental sessions, all labels were removed from the sprays, leaving only the plastic seal on the cap. This seal was shown to the participant to demonstrate that the seal was intact, per safety guidelines prescribed by the IRB.

Participants were then instructed to view the sequence of 25 neutral images and rate each in terms of how it made them feel. Participants were also instructed to spray the assigned flavor three times before the first image was displayed in order to ensure that taste experience was initiated. They were then instructed to spray once more each time an image was displayed to maintain the taste sensation. Thus, the total number of sprays was approximately 28, which is approximately 0.1 ounces, or 80% of the total volume of the spray bottle. However, this is only an estimate of the amount ingested, as the spray candies were not metered and the exact dosage was subject to individual differences and practices of the participants. As each image was displayed, the SAM illustrating the pleasantness scale appeared at the bottom of the display as a guide. Participants indicated their rating by pressing the corresponding number on the keyboard. The SAM illustrating arousal scale then replaced the pleasantness SAM and participants rated the same image on this scale.
This sequence was repeated for each image and the order of images was randomized. After rating all images, participants were debriefed, thanked, and dismissed.

Results

A Multivariate Analysis of Variance (MANOVA) was conducted to determine the effects of taste quality on arousal and pleasantness ratings (DV’s). For both the pleasantness and arousal dependent variables, 19 participants ingested the sweet taste, 19 participants ingested the spicy taste, and 17 participants ingested the sour taste. The omnibus test was marginally significant, Wilks’ Lambda: $F(2, 102) = 2.14, p = .08, \eta^2_p = .08$, which warranted further analysis. A main effect was found for taste quality on pleasantness ratings, $F(2, 52) = 4.10, p < .05, \eta^2_p = .14$; see Table 1 for means and standard deviations. On average, participants who ingested the sweet spray rated the neutral images as more pleasant than the midpoint of the scale, while those who ingested the sour or spicy sprays rated the images as less pleasant than the midpoint. Post-hoc comparisons (Bonferroni correction) showed that sweet taste quality resulted in higher pleasantness ratings than sour, $t(34) = 2.47, p = .02$, Cohen’s $d = .80$. In addition, sweet resulted in higher pleasantness ratings than spicy, $t(36) = 2.75, p = .009$, $d = .89$. No main effect for arousal ratings was found, $F(2, 52) = .98, p = .38, \eta^2_p = .04$.

The taste qualities were then compared to the normed ratings of the IAPS. Each image used in the IAPS has a normative value on both the pleasantness and arousal scales. The 25 images’ normed ratings were averaged to obtain a single value for each scale. The difference between those values and the participants’ average ratings were computed. For example, a difference score of zero on either the pleasantness scale or the arousal scale would mean that the participant had the same average rating of the images as the general population (disregarding any potential effects of the taste quality). Thus, the taste qualities were compared on each scale to their respective normed ratings (in this case, one sample $t$ tests were conducted using a value of 0). Both sour and spicy tastes produced average arousal ratings that were significantly greater than the average normed arousal ratings ($M = 4.32$ on the scale) across the images, sour: $t(16) = 3.71, p = .002, d = .90$; spicy: $t(18) = 3.27, p = .004, d = .75$. Furthermore, the sweet spray produced the largest positive arousal difference from the normed average, $t(18) = 6.96, p < .001, d = 1.60$. Analysis of the pleasantness difference ratings revealed average ratings that were significantly less than the normed ratings for both the sour and spicy tastes, $ps < .01, ds > .80$. However, the sweet spray ratings were not significantly different from the normed ratings, $t(18) = - .99, p = .34$. This could account for the significant difference in overall pleasantness ratings between sweet vs. sour and sweet vs. spicy.

Discussion

As hypothesized, experiencing a sweet taste, rather than either sour or spicy, resulted in greater feelings of pleasantness. In addition, spicy and sour tastes tended to suppress pleasant feelings, consistent with previous research (e.g., Greimel et al., 2006; Steiner, 1974). However, the sweet taste did not enhance the pleasantness effect above normative ratings of the neutral images. Arousal did not differ among taste qualities, which was not consistent with findings of some studies (e.g., Robin et al., 2003); however, measures are difficult to compare directly. These findings were generally consistent with previous findings on taste sensation, especially those that suggested sweet-tasting foods evoke pleasure more than the other taste qualities.

The process in selecting foods that are sweet or sour may be evolutionarily advantageous. The advantage of associating these foods with our emotional system seems important for learning. The primate visual system appears to be more efficient at detecting specific food sources, particularly those high in glucose, than determining ripeness (Riba-Hernandez, Stoner, & Lucas, 2005); however, sour tastes may have evolved to aid in distinguishing ripeness once food is found (Breslin & Spector, 2008). Tastes may also be adapted to encourage consumption of foods that are high in calories and rapidly digested (such as glucose). Considering that glucose is the energy source used by the brain, such rapid digestion would present a benefit for our
ancestors whose lifestyle was nomadic and much more active than our own.

Although the pleasant feelings induced by sweet tastes in comparison to other flavors may be adaptive, we cannot determine the role of wanting sweet foods given these findings. As with all other sensory experiences, humans cannot separate the emotional experience from taste itself. In other words, the desire for a specific food may be influenced by a specific emotional state, or a specific taste may influence a new emotional state. There is evidence to suggest both hypotheses. For example, Jeffrey et al. (2009) found that elderly female participants experiencing negative emotions prior to consuming food sought sweets more often than other flavored foods. Dingemans, Martijn, Jansen, and van Furth (2009) argued that binge-eating depressed participants eat to decrease negative emotions, suggesting that sweet foods have an antidepressant quality. Christensen and Brooks (2006) concluded that the relationship between affective state and dietary choices is bidirectional. Rolls, Critchley, Verhagen, and Kodohisa (2010) argued through neuroimaging results that the confluence of sensory stimuli (taste plus odor) activates certain brain areas to create the sensation of pleasantness. Therefore, an individual may never know if she desires sweet-tasting foods because they make her happy, or if she is happy because she is receiving what is desired. Our findings cannot conclude one direction or the other, though we can conjecture from our design that the latter is more likely.

However, conscious cognitive appraisal may be required to override conditioned and innate preferences for pleasant sweet foods and avoidances of more unpleasant foods, such as sour and spicy foods. Recent evidence suggests obese individuals are more implicitly attracted to sweet foods than normal-weight individuals (Sartor et al., 2011). The growing obesity problem in the United States makes education and awareness of human taste preferences more important than ever, especially in the case of artificially sweetened drinks and foods, such as those containing high-fructose corn syrup (Bray, Nielsen, & Popkin, 2004). More research is needed to determine the role of self-regulation and other psychological factors in the process of dietary decision-making, and determining the causal path from taste quality and sensation to food selection.

Though these findings extended the literature of the relationship between taste quality and emotion, there were limitations of the study that should be addressed. While the spray candies used seemed to have elicited the desired taste quality based on the data, the likability of and proximity to the nominal taste quality were assumed and not systematically pretested. In other words, the sweet taste was assumed to be the main component of strawberry flavoring, the sour taste was assumed to be the main component of the raspberry flavoring, and cinnamon flavoring has been linked to sensations of spiciness (Koroch, Ranarive, Behra, Julián, & Simon, 2007). Furthermore, these spray candies were chosen for convenience, consistency of texture and intensity, as well as a novel approach to the study of taste qualities. Future research should take steps to operationalize the taste qualities used, in order to strengthen the methodology and conclusions. This would ensure that the taste quality reported is isolated from other qualities. Additionally, we did not seek ratings of preference from the participants. Future research should ask this question, especially if testing a within-subjects design. Although there are perhaps individuals who enjoy the taste of cinnamon, for example, they may be the minority in a between-subjects design where participants are unaware of other conditions (i.e., taste qualities). Last, physiological measures in addition to behavioral self-report data would be beneficial for bringing consistency to the findings (e.g., Robin et al., 2003), as well as linking the two within the extant literature.

There is no doubt that taste quality affects emotion. In the present study, sweet tastes appear to have caused increased pleasantness and arousal, and sour and spicy tastes were regarded as unpleasant in comparison. However, it is unclear what factors are involved in the process. Moreover, this clearly depends on how emotion and emotional states are defined, as well as the design employed to measure the emotional states. We suggest that more work be done in this area. There is still much that is not understood in the area of emotion and chemical senses.

References
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One of the first relationships humans forge as infants is the relationship between child and parent. The strength of that relationship is based on the attachment that child feels to his/her parental figure (Bowlby, 1969). Attachment researchers focus on assessing and evaluating variables that could negatively or positively affect attachment (Ding, Xu, Wang, Li, & Wang, 2012; Meldrum, Young, & Flexon, 2012), yet there are many areas which remain unexplored. It has been theorized that empathy between two people within an attachment relationship will affect the attachment, yet the degree to which empathy affects child and parent attachment has not received much empirical attention (Britton & Fuendeling, 2005). The hypothesis that a parent’s age relates to their empathy for their child and the security of the parent-child attachment has yet to be investigated.

Parent-Child Attachment

Introducing the theory of internalized attachment in 1969, Robert Bowlby’s work focused on how children develop survival skills at birth and how these survival skills influence caregivers and their overall survival (Metzger, Erdman, & Ng, 2010). In his work, Bowlby introduced the idea that an infant could have either a secure or an insecure attachment. Assessment of attachment largely looks to the work of Mary Ainsworth, who introduced an assessment of attachment. Using the strange situation method, a child’s attachment can be defined as secure, insecure, and avoidant (Ainsworth & Bell, 1970). Since this groundbreaking research, however, many other methods for assessing attachment have been explored. One of these methods is the interview and questionnaire method. Developers such as Bhakoo, Pershad, Mahajan, and Gambhir (1994) found that questionnaires could validly assess mother to child attachment. Using...
Attachment, Empathy, and Parental Age

Parental Empathy
Empathy is defined using two different dimensions. Affective empathy means vicariously experiencing the same or similar emotions as others, whereas cognitive empathy is related to the complete understanding of others through managed perspective taking (de Wied et al., 2007). Oppenheim, Koren-Karie, and Sagi (2001) investigated the theme of empathetic understanding and early attachment and found significant relationships between the two. The authors found that children who were securely attached had parents who made use of their understanding of their child’s point of view and used it in their favor. They also defined parents of children who were securely attached to be those who held a rich understanding of their children’s point of view. Empathy has been a pivotal topic of discussion in the development of support programs aimed at helping attachment relationships in at-risk families. Largely, the relationship between empathy and attachment has been defined as a circle of security within which children are free to explore their world and then return to their empathetic, understanding caretakers (Page & Cain, 2009). Deutscher, Fewell, and Gross (2006) support this concept in their investigation of intervention programs. Their research found that programs which boasted the highest success rates in allowing parents and children to securely form attachment bonds were programs which focused on child comprehension and sympathetic/empathetic understanding. The authors suggested that future programs redirect their focus to this area as well.

Attachment and Empathy
Self-concept, in relation to attachment, often goes beyond mere childhood acceptance and attachment to a parent. Kilmann, Vendemia, Parnell, and Urbaniak (2009) looked at attachment styles between mothers and their daughters and how mothers’ own attachments and displays of confidence, self-worth, and interest in their child's self-worth affected daughters’ attachment scores. Parents who displayed acceptance, willingness to forgo control, and who were competent had securely attached daughters. Britton and Fuendeling (2005) found that when participants reported their levels of parental attachment as well as empathy levels, strong parental attachment correlated with higher levels of self-reported empathetic concern from parents. Feldman (2007) also supported the notion that attachment and empathy have a direct relation to one another. She concluded that child and mother behavior work in an integrated circle, and children learn major aspects of empathy from securely attached parents. In summary, children who are securely attached to their parental figure are found to have higher levels of empathy, which is believed to have been learned by the secured parental figure. These data support the notion that children of accepting and open parents (i.e., those who displayed higher levels of empathetic understanding) display better attachment.

Parental Empathy, Attachment, and Age
The majority of age-related empathy research has found that empathy is developed over the lifespan. Empathy is believed to begin to develop around the age of five, but new research in the field supports the idea of empathy understanding at an even younger age (Grühn, Rebucal, Diehl, Lumley & Labouvie-Vief, 2008; Spreng, McKinnon, Mar & Levine, 2009). Nonetheless, the empathy developed in childhood is inevitably self-centered and requires much further development (Bryant, 1982). Studies have shown that even in adolescence and early adulthood, empathy has not fully developed, and many young adults may have very low levels of empathy that require many more years’ worth of life experience before fully forming (Grühn et al., 2008). A lack of empathy in young adults leads to the question of how age in parents may influence the empathetic understand between parents and children, and in turn, how attachment relationships can be influenced. Giardino, Gonzalez, Steiner, and Fleming (2008) examined...
physiological differences between empathetic understanding in teen moms and non-teen moms. They found that teen mothers had no changes in levels of cortisol (a chemical produced when a person is feeling sympathetic towards another) in their saliva in reaction to their children’s cries, nor showed significant changes in heart rate in response to cries. Non-teen mothers showed spikes in both physical signals. Swain, Lorberbaum, Kose, and Strathearn (2007) also found that parental brains which have less “experience” with the emotional responses required for empathetic awareness and responsiveness are unable to properly process all the emotional and physical responses required for proper understanding and may be less empathetic toward their children. However, the research has been inconclusive, because there is little research in the area of adolescent and young adult empathy. Scales and questionnaires have been developed to assess and measure empathy during adolescence, but the research has not looked at cross-sectional comparisons to other age groups, including both young and average age parents (Hashimoto & Shiomi, 2002). Research that prolonged separation from an infant led most mothers to feel a decreased attachment to their children (Bhakoo et al., 1994). Previous research has not looked at the relationship between attachment, parental empathy, and parental age.

For this investigation, the relationship between parental empathy, child attachment to the parental figure, as well as parent’s age were assessed. We hypothesized that parent age at the time of their first child’s birth (i.e., the child whose attachment was being assessed), would be positively correlated with child-directed parental empathy (H1). We also hypothesized that parents who reported higher levels of parental empathy as well as overall, basic empathy would also report their child as having a more secure attachment with the reporter than those who reported lower empathy (H2). Because we expected empathy and attachment to be related, and age was hypothesized to predict empathy, we also predicted that parental age would positively correlate to attachment.

Method

Participants

Participants were recruited through advertising in local area daycares and through email messages from the daycares to parents. A total of 127 completed surveys were collected. The average age of the participant when their target child was born was 29 (SD = 7.03). Children were between 1.25 and 11 years of age (M = 4.47, SD = 3.16). Six participants were dropped from the analysis due to the fact that the child they answered the survey for (their firstborn child) was outside of the proper age range for the assessment of attachment using the selected attachment questionnaire. Of these participants, 86% (n = 105) were women and 13% (n = 17) were men. For self-reported ethnicity, 82% (n = 100) of participants identified as non-Hispanic White, 10.7% (n = 13) identified as Hispanic/Latino, 2.5% (n = 3) identified as Black/African American, 2.5% (n = 3) as American/Alaskan Native, and 1.7% (n = 2) as ‘other’ (both identifying as Australian).

Procedure

Prior to data collection, Institutional Review Board approval was received for the study (Protocol #1121). All data was collected online. Local daycares were contacted months prior to the online survey’s launch and asked for permission to post flyers and send emails in regards to the study and the online survey. Six different daycares in the area agreed to advertise the study to the enrolled parents through flyers placed in children’s cubbies as well as through email. All daycares had classrooms serving children from infancy to Pre-K, with each classroom advertising to about 10 families. We estimate that between 250 and 300 families were contacted for the study for a response rate between 42 and 50%. Flyers and emails advertised that any participant who chose to complete the survey would be given an opportunity to enter their email address at the end of the questionnaires for a chance to win one of six $25 gift cards. Upon entering the survey website, participants were required to fill out a consent form which explained the purpose of the research and confirmed that participants were 18 years of age or older. Participants were then asked to fill out a demographic survey inquiring to their age at the time of their firstborn child’s birth, their firstborn child’s current age, ethnicity, biological sex, and estimated yearly income. Participants were then presented with the attachment and empathy measures. After submission of this survey, participants were redirected to a debriefing page and an external link for their choice of submitting their email for the drawing.

Measures

Attachment. Attachment was measured via the 20 question Kinship Center Attachment Questionnaire (KCAQ: Kappenberg & Halpern, 2006). The
questionnaire measures attachment and has four subscales: positive adjustment/development, negative behavior, emotional reactivity, and distancing from caregiver support. The Chronbach's alpha for the measure as a whole is (α = .75). Through the overall attachment measure, the higher the score, the more insecure the attachment is assumed to be. Most items within the subscales are worded negatively, but some are positively worded and are reverse coded. Within the subscales, positive adjustment/development (α = .69) includes questions assessing social skills and availability (e.g., “My child plays well with other children.”). Negative behavior (α = .63) assesses poor social or defiant behaviors (e.g., “My child destroys or breaks things that belong to others”). Emotional reactivity (α = .65) assesses dependency behaviors (e.g., “My child is excessively clingy”). Distancing from caregiver support (α = .56) assesses avoidant behaviors, (e.g., “When my child is in pain, he or she does not show it”). The KCAQ uses a 7-point Likert-type scale with items rated from 0 (never/rarely) to 6 (almost always).

**Basic empathy.** The Basic Empathy Scale (BES; Albiero, Matricardi, Speltri, & Toso; 2007) was originally developed for measuring basic empathy in adolescents. For the present study, the questions were reworded to shift the emphasis from friends (e.g., “My friends’ emotions don’t affect me much”) to others, (e.g., “Other people’s emotions don’t affect me much”). The reliability for the scale was high at (α = .87). The BES contains two subscales: cognitive empathy (9 items, α = .79) and affective empathy (11 items, α = .85). The scale assesses agreement to the items based on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicated higher levels of basic empathy toward others. A total of seven items were reverse scored.

**Parental empathy.** Parental empathy was assessed via Psychogiou, Daley, Thompson, & Sonuga-Barke’s (2008) adaptation of the Interpersonal Reactivity Index (IRI; α = .83) and reformatted into the Parental Empathy Scale (PEI). The measure contains three subscales: perspective taking (α = .77; e.g., “I always try to take an objective approach to dealing with my child”), emotional concern (α = .77; e.g., “I often have tender, concerned feelings for my child”), and psychological egotistical distress (α = .74; e.g., “I tend to lose control during my child’s emergencies”). Each subscale contains seven items that are rated on a 5-point Likert-type scale ranging from 0 (does not describe me well) to 4 (describes me well). Seven items are reverse coded and the higher the final score, the higher the parental empathy a parent is assumed to feel for his/her child.

**Results**

**Parent Age and Empathy**

The age of parents at the time of their oldest child’s birth was compared to their personal scores on the parental empathy scale (PEI). Initial tests were run to find that there was a linear relationship between age and PEI scores as well as one of the BES subscales. Following this, a Pearson’s r correlation was calculated for the full scales of both the parental empathy (PEI) and basic empathy (BES) measures. These correlations can be seen in Table 1. A significant positive correlation was found between parental empathy (PEI) and parental age, \( r(120) = .22, p = .014 \). This finding supports the initial hypothesis. No significant relationship between the basic empathy scale (BES) and age was found. However, subsequent correlational analyses were conducted to examine the relationship between subscales. For the BES, only one subscale, personal distress, correlated with parental age, \( r(120) = .21, p = .036 \). Personal distress-related empathy increased as parental age increased.

**Parent Empathy and Child Attachment**

A significant correlation was found between basic empathy and KCAQ scores. Basic empathy positively correlated with the KCAQ scores, \( r(120) = .28, p = .002 \). A significant correlation was also found between parental empathy and secure attachment, \( r(120) = .19, p = .020 \). This finding indicates that parents reporting higher levels of basic empathy reported that their children had higher levels of insecure attachment. All the subscales within the BES had significant correlations with KCAQ scores. These positive correlations, seen

### Table 1

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. General Empathy (BES)</td>
<td>50.34</td>
<td>7.03</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Parent Empathy (PEI)</td>
<td>47.03</td>
<td>7.7</td>
<td>-0.13</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. Attachment (KCAQ)</td>
<td>48.09</td>
<td>8.09</td>
<td>0.28</td>
<td>-0.21</td>
<td>-</td>
</tr>
<tr>
<td>4. Age</td>
<td>29.12</td>
<td>7.04</td>
<td>0.48</td>
<td>-0.22</td>
<td>0.13</td>
</tr>
</tbody>
</table>

*Note:* \( p < .01 \)
in Table 1, do not support the hypothesis that as basic empathy increases so will secure attachment. However, the PEI correlated negatively with KCAQ scores, \( r(120) = -0.21, p = 0.036 \), and therefore suggests that parents who reported higher levels of parental empathy tended to have children with less secure attachment. A final, notable finding within the subscales is that only one subscale, personal distress, correlated with parental age. Personal distress-related empathy increased as parental age increased. A stepwise multiple linear regression was calculated to predict participants’ attachment score (KCAQ) based on their basic empathy (BES) and Parental Empathy (PEI) score. The regression equation was significant, \( F(2,119) = 7.30, p < .001 \), with an \( R^2 \) of 0.094. These findings show that not only do empathy and parental attachment have a significant relationship, but that empathy scores for both personal as well as parental empathy may be used to predict overall attachment between parents and children.

**Parent Age and Child Attachment**

A Pearson’s \( r \) correlation was calculated between the KCAQ and parents’ age at their child’s birth. No significant relationship was found, \( r(120) = 0.13, p = 0.146 \). This does not support the hypothesis that parental age and self-reported child-parent attachment are related.

**Discussion**

Although the study found significant correlations and regressions between empathy and attachment, the findings did not completely support the overall hypotheses. The hypothesis that age is related to parental empathy was supported by the data. However, parental empathy scores related oppositely to attachment than initially hypothesized. With such emphasis placed on empathy and attachment, it is curious how these results came about. However, many factors contribute to parent-child attachment above and beyond empathy. Page and Cain’s (2009) study on the security of attachment and its relation to empathy did support the notion that empathy is important to secure attachment, but many other factors, including encouragement of exploration and parenting styles were found to relate strongly to secure attachments. Though empathy may be important to attachment, the relationship between parent and child outside of the empathy aspect may be more important still. This notion is also supported by Britton and Fuendeling’s (2005) study. Their research found that parental empathy, as well as many other moderating factors, such as parental temperament correlated with more secure parental concern.

This research leads to question the reliability in self-reported attachment and empathy and the confidence factor of self-report assessments. Conrad, Gross, Fogg, and Ruchala (1992), found that some mothers who were maladapted to caring for their children (including not responding empathetically to their children), reported higher confidence in their childcare skills than those mothers who responded to their children’s need appropriately. Conrad et al. (1992) dubbed these mothers “naively confident” (p. 360) and found that they were at an incredibly high risk for low responsiveness and low child-parent attachment due to the self-report of their parenting confidence and their inability to recognize breakdowns in their mother-child interactions. An excellent way to control for this variable in future research would be an inclusion of a parental self-efficacy measure. This measure could help control for perceived efficiency in variables such as attachment relationships and empathic understanding and would assess actual parenting confidence and abilities (Barnes & Adamson-Macedo, 2007).

The results revealed there was a significant relationship between parental age and parental empathy. This supports the notion that empathy is developed as one ages, and younger parents may have not yet developed their empathetic understanding as thoroughly as older parents. Research has previously supported the notion that teen parents may experience lower levels of empathy toward their children. Studies supporting the initial hypothesis discussed how teens and adolescents require time and experience to gain empathetic understanding (Grühn et al., 2008). Swain et al., (2007) found parents who have had less physical time dealing with the mental act of empathetic understanding (such as those still in their teens and early twenties), have increased difficulties understanding and physically reacting to the empathetic needs of their children. Experience with childrearing, which generally is expected to increase due to exposure to children, is another influence to keep in mind when it comes to parental reports of empathy in relation to age. Parents may express empathy more effectively to their proceeding children than to their first child simply due to experience. Being that the current study did not inquire as to the number of children a parent currently had and did not measure...
empathy or attachment in the first child compared to others, this is a considerable limitation to the study and should be referenced in future works. Although the pool of participants in their teens or early twenties at the time of their child’s birth was not as large in the current study’s sample, the results suggest that across the small range of ages within the current participant pool, empathy did increase as age increased. Further research may focus on cohort effects. Lifespan studies in the area of empathy and age have found that certain cohorts differ in their reports of empathy across a longitudinal study (Grühn et al., 2008). It would be compelling to find if recent historical events have affected current teen cohorts and their parental empathy and attachment.

One of the issues that surfaced after data collection dealt with the fact that the Kinship Center Attachment Questionnaire was meant for parents of children 0 to 6 years of age. However, about 33% of valid participants had children older than six. The questionnaire was thoroughly reviewed, and we determined that all of the questions were valid to ask parents of older children. However, it is important to bring this to the attention of those who wish to conduct future research in this area, as children’s ages may have played a role in the present results. Traditionally, the measurement of attachment has been completed through observations and coding rather than questionnaires. Though there has been significant progress in the development of questionnaires, there is still a negative perception in the psychological community against using these measures in lieu of observations. It is generally believed that explicit questionnaire measures are incapable of capturing attachment behaviors (Shmueli-Geotz et al., 2008; Condon et al., 2008).

With the promising results collected in this initial study, it is quite plausible that a similar study using an age-diverse participant pool would draw a different relation between variables. These pools could be achieved via resources such as young parenting groups, advertising in areas such as Planned Parenthood, or advertising at local parenting classes. Daycares as a main recruitment location may have hindered the study from obtaining diverse results simply because parents of younger children may not have access to daycare services or the Internet. A correction of recruitment methods could allow for a much more representative pool of participants.

Conclusions
In conclusion, although all of the hypotheses were not supported, the results lend credibility for studying parental empathy in future attachment research. The attachment between a child and a parent is one of the resounding and influential building blocks in a child’s life (Bowlby, 2007). Time and time again, research has shown the importance of a secure attachment relationship in relation to children’s achievement, confidence, and self-worth (Cassidy, 1988). Research should continue to examine which factors could affect attachment relationships negatively as well as positively. With research giving us an understanding concerning which variables affect attachment, educators, and researchers can strive to inform future and current parents on how to best relate to their children and create meaningful, secure bonds. At this point, relationships between empathy, parental empathy, attachment, and parental age have been shown in this study, and further research in this field will undoubtedly produce results that will benefit the field of developmental psychology and attachment.

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Black and Leszczynski | Attachment, Empathy, and Parental Age


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Connecting Gender and Mental Health to Imposter Phenomenon Feelings
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ABSTRACT. The impostor phenomenon (IP) occurs when high-achieving individuals attribute their successes to external factors and are unable to internalize success (Clance & Imes, 1978). Previous data show correlations between this phenomenon with gender and psychological disorders (Oriel, Plane, & Mundt, 2004). This study expanded on prior research in determining whether gender, mental health, perfectionism, test anxiety, and low self-esteem are significantly related to IP feelings. The sample was composed of 506 participants. Women were significantly more likely to report impostor beliefs than men, $t(504) = 3.44, p < .001$. Mental health, $r(500) = -.48, p < .001$, perfectionism, $r(506) = .48, p < .001$, and test anxiety, $r(504) = .50, p < .001$, were significantly related to impostor beliefs, whereas low self-esteem was not related to the IP, $r(500) = -.47, p = .09$. Research on this topic is important because the impostor phenomenon is pervasive in academic and numerous professional environments.

The impostor phenomenon (IP) is a psychological phenomenon of conflicting research. The term was first coined by Clance and Imes (1978) to describe a high-achieving individual that feels like a fraud and thus attributes success to external factors, such as hard work, luck, and charm. Research was ambiguous in regard to gender differences in IP beliefs. Although some authors reported that women experience IP feelings more than men (King & Cooley, 1995; Kumar & Jagacinski, 2006; McGregor, Gee, & Posey, 2008), other data showed no significant difference (Caselman, Self, & Self, 2006; Cromwell, Brown, Sanchez-Hucales, & Adair, 1990; Sonnak & Towell, 2001). Additionally, other authors found relationships between cognitive distortions, such as perfectionism, and IP feelings (Henning, Ey, & Shaw, 1998; Thompson, Davis, & Davidson, 1998). In previous research, correlations existed between depression, anxiety, low self-esteem, and IP feelings (Cozzarelli & Major, 1990; Cromwell et al., 1990; Sonnak & Towell, 2001). These maladaptive cognitive patterns related to IP have clinical implications because of the potentially elevated risk for other issues such as depression, anxiety, and low self-esteem. We designed this study to expand upon existing research to determine if gender is a significant factor in determining the IP and to determine other psychological variables that are related to IP beliefs.

Gender
There have been inconsistent findings about the association of gender and IP beliefs. Some researchers argued that there were gender differences and that women were more likely to experience the IP than men (Henning et al., 1998; King & Cooley, 1995; Kumar & Jagacinski, 2006). When Clance and Imes (1978) initially studied the IP, they only analyzed data for female participants because they believed IP predominantly occurred in women based on the attribution theory. The attribution theory, in relation to IP, suggests that women have lower expectations than men, so women attribute...
their success to a temporary cause (Clance & Imes, 1978; Deaux, 1976). Additionally, Clance and Imes (1978) might have initially thought the IP affected women more than men because it became a new psychological phenomenon during the second wave of feminism (Jarrett, 2010). We believe this is important to note because the feminist wave may have brought women’s standings to their attention and challenged their roles in society. Later, Clance and colleagues hypothesized that IP feelings are more present in women because the IP may stem from society’s gender stereotypes with assertiveness and accomplishments more readily associated with men than women (Clance, Dingman, Reviere, & Strober, 1995).

Some researchers compared men and women and found women report greater impostor fears than men (Henning et al., 1998; King & Cooley, 1995; Kumar & Jagacinski, 2006). However, the finding that women suffer more than men from IP beliefs was not found universally. Although originally the IP was thought to be more present in women, other researchers found that IP feelings are experienced by men at the same rate (Langford & Clance, 1993). Still, data showed no significant difference between gender and IP beliefs (Bernard, Dollinger, & Ramaniah, 2002; Thompson et al., 1998). For example, when investigating the relationship between the IP and self-esteem, mental health, and parental rearing style, Sonnak and Towell (2000) found no significant sex differences. Furthermore, because most IP research was based on college, graduate, and professional samples, it is important to note that a few studies focusing on adolescent populations found no significant gender differences in IP scores (Caselman et al., 2006; Cromwell et al., 1990). Because there were contradictory findings, further research is necessary to clarify whether or not there is a relationship between gender and the IP.

**Mental Health**

In addition to gender, another aspect to investigate with the IP is mental health. When the IP is identified in a client, it is generally accompanied by other psychological problems, such as depression (McGregor et al., 2008; Oriel et al., 2004; Ross & Krukowski, 2003; Ross, Stewart, Mugge, & Fultz, 2001) and anxiety (Clance & O’Toole, 1987; Thompson et al., 1998). When Bernard et al., (2002) studied the IP and the Big Five personality factors, they also found that neuroticism was positively related to the IP. This finding is not surprising, because depression and low self-esteem are facets of neuroticism. Further studies connected neuroticism with the IP, indicating that of the Big Five personality traits, for neuroticism, depression was specifically a significant predictor of the IP (Ross & Krukowski, 2003; Ross et al., 2001). Additionally, there are links between the IP and negative affectivity, which is another characteristic of depression (Oleson, Poehlmann, Yost, Lynch, & Arkin, 2000). Thus, the IP and depression may often coexist in a person because of similarities between the two psychological constructs, such as pressure to live up to a successful image, negative thoughts, and self-doubt.

**Perfectionism and anxiety.** People with IP feelings are often notorious for having high standards, and thus they may overwork to try to meet their idea of perfection (Clance, 1985a). However, ultimately, they credit their success to hard work, which they feel they have to put do, because they do not feel as smart or skilled in comparison to their peers (Parkman & Beard, 2008). Clance (1985b) stated that men and women who have multiple roles in their lives and hold perfectionist standards may be likely to hold IP beliefs. This could be because the tendency to overwork and the need to feel special is characteristic of the IP, which is also related to perfectionism. Perfectionism was the strongest predictor of the IP in a study of medical, dental, nursing, and pharmacy students (Henning et al., 1998). An individual who balances numerous roles could have the IP because the person may feel the need to be perfect in all aspects of life (Clance, 1985a). Authors of one study examined how people with the IP reacted to both failure and success (Thompson et al., 1998). The authors discovered that regardless of the outcome, be it failure or success, people who endorse IP reported higher levels of anxiety than people who do not endorse IP (Thompson et al., 1998). The higher anxiety levels that people with the IP reported could be a product of self-criticism and high standards, as these are elements of perfectionism that are more pronounced in individuals with the IP than in people who do not endorse IP (Thompson et al., 1998). Several data indicated that the IP is related to higher levels of anxiety (Clance & O’Toole, 1987; Cromwell et al., 1990; Oriel et al., 2004; Sonnak & Towell, 2001). Because anxiety is also a facet of neuroticism, the relationships between anxiety and neuroticism and neuroticism and the IP could explain why the IP and anxiety are correlated (Ross & Krukowski, 2003).
Self-Esteem. As previously mentioned, the IP is often presented with other psychological ailments, such as low self-esteem. Low self-esteem has been strongly, negatively correlated with IP feelings and positively related to depression (Kolligan & Sternberg, 1991). Some researchers argued that self-esteem and the IP are too closely related (Cozzarrelli & Major, 1990; Fried-Buchalter, 1992). Fried-Buchalter (1992) argued that the IP may be overly similar to fear of success and fear of failure, which evokes low self-esteem and lack of confidence; therefore, she believed that caution is necessary when examining data and developing new psychological constructs. Cozzarrelli and Major (1990) conducted a study to determine if the IP was a separate measure of low self-esteem. As predicted, the IP was significantly related to low self-esteem, but the authors believed the relationship between the IP and low self-esteem may have been a result of initial differences in self-esteem rather than self-esteem being a uniquely contributing predictive factor; however, Langford and Clance (1993) argued that self-esteem is a separate psychological construct than the IP because self-esteem measures a broader area of attitudes and feelings about the self than the IP. Statistical analyses yielded a negative correlation between the IP and self-worth in adolescents, but that self-concept was more predictive of IP beliefs in women than in men (Caselman et al., 2006). The relationship between low self-esteem and IP scores was found in adult samples as well (Ross & Krukowski, 2003; Sonnak & Towell, 2001). Because of the uncertainty of whether the IP and self-esteem are separate constructs, further research is essential. A greater comprehension of this phenomenon is necessary to better treat the IP in order to help individuals establish a higher self-esteem and sense of self-worth (Langford & Clance, 1993). The goal of the current study was to expand on previous research to increase understanding of the IP by analyzing these related variables together in order to advance treatment.

Hypotheses
First, we hypothesized that women would report higher levels of the IP than men. Secondly, we believed participants who had low levels of mental health would have higher levels of the IP than participants who had high levels of mental health as defined by the Global Health Questionnaire. Thirdly, we hypothesized that participants who endorsed higher perfectionist ideals would also endorse more IP beliefs. Fourth, we predicted that participants who had high levels of test anxiety would have higher levels of the IP than participants who had low levels of test anxiety. Fifth, we believed participants with low levels of self-esteem would have higher levels of the IP than participants who had high self-esteem. Sixth, we hypothesized that gender, mental health, perfectionism, test anxiety, and self-esteem would predict IP scores.

Method
Participants
The sample consisted of 506 participants, 105 men (20.8%) and 401 women (79.2%). The average age of participants was 21.02 years. Participants reported their racial backgrounds as White American (64.6%), African American (17.2%), Hispanic (3.4%), Asian American (6.9%), multi-racial (7.7%), and American Indian (0.2%). All students were enrolled in a U.S. institution of higher education with 13.3% in their first year, 19.5% in their sophomore year, 26.8% in their junior year, 25.4% in their senior year, and 15% were graduate students. See Table 1 for more demographic data.

Procedure
After obtaining Institutional Review Board approval, participants were recruited by 11 undergraduate research assistants. Convenience sampling and snowball sampling technique were used for this study. The research assistants used e-mail and paper flyers on campus to recruit participants, both of which included the survey link. To be eligible to participate in this study, individuals had to be an undergraduate or graduate students. There was no time limit on the survey, and the survey respondent could start, stop, and restart the survey at his or her convenience. The online survey took about 20 min to complete and included questions covering demographic, school, and health information. Participation was voluntary; those who agreed to participate were automatically entered into a random drawing for one of four $50 Target gift cards.

Measures
Impostor phenomenon. The Clance Imposter Phenomenon Scale (CIPS; Clance, 1985a) evaluated imposter beliefs, characterized by a high-achieving individual who firmly believes he or she is a fraud. The 20-item scale used a rating scale ranging from 1 (not at all true) to 5 (very true). Higher scores indicated greater IP beliefs. An example item was “I can...
give the impression that I’m more competent than I really am.” Holmes, Kertay, Adamson, Holland, and Clance (1993) used both a clinical and nonclinical sample in their study to evaluate the CIPS. Holmes et al. (1993) found an alpha coefficient for the scale of .96, indicating strong internal consistency. For the present study, an alpha coefficient of .91 was found for the CIPS scale.

**Mental health.** The abbreviated version of the General Health Questionnaire (GHQ-12; Goldberg, 1972) was used to assess general wellbeing. It is a screening instrument to detect psychiatric disorders in community settings and nonpsychiatric clinical settings. The questionnaire consists of 12 items. A typical question is “Have you recently been feeling unhappy and depressed.” The scale ranged from 1 (not at all) to 4 (much more than usual). Higher scores indicate better mental health. Hardy, Shapiro, Haynes, and Rick (1999) reported an alpha coefficient of .89 for the scale and established both convergent and discriminant validity evidence for the GHQ by finding strong correlations with other measures of mental and physical health. For the current study, an alpha coefficient of .88 was found for the GHQ, which establishes further evidence for reliability.

**Perfectionism.** The 14-item Child and Adolescent Perfectionism Scale (CAPS; Flett, Hewitt, Boucher, Davidson, & Munro, 1997) was used to measure perfectionism. An example item is “I try to be perfect in everything I do.” A Likert-type scale was used ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate greater perfectionism. To establish validity evidence, CAPS significantly correlates with depression and anxiety (Hewitt et al., 2002). Castro et al. (2004) found the scale to be reliable over a 1 week period. For this study, an alpha coefficient of .89 was found.

**Self-esteem.** The Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) consists of 10 items that measures self-esteem. An example item includes “I feel that I’m a person of worth, at least on an equal basis with others.” A Likert-type scale was used ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate higher self-esteem. Convergent, discriminant, and predictive validity have been supported in numerous studies, such as the following. Hagborg (1996) found the RSE correlated with similar self-esteem measures in adults and children. Rosenberg (1965) evaluated predictive validity and found self-esteem related to many social and interpersonal consequences. Reliability estimates are strong across ethnic groups (Hatcher & Hall, 2009). An alpha coefficient of .72 was found in this study.

**Test anxiety.** Instead of the TAI-20 (Spielberger, Gonzalez, Taylor, Algaze, & Anton, 1978), we used Taylor and Deane’s (2002) shortened, five item version, the TAI-5. An example item is “I wish examinations did not bother me so much.” The TAI asks participants to rate their level of test anxiety on a 1 (almost never) to 4 (almost always). To establish validity evidence, Marszalek (2009) found that the TAI-5 correlated with other measures of anxiety. Taylor and Deane (2002) reported an alpha coefficient of .86 for the short version of the scale. Test anxiety had an alpha coefficient of .93 for this study.

**Results**

A *t* test was used to determine if there was a significant difference between gender and IP scores. We found there was a significant difference with women more likely to report IP feelings than men, *t*(504) = 3.44, *p* < .001, *d* = 0.42. Correlations were used to analyze the hypotheses regarding IP, mental health, test anxiety, perfectionism, and self-esteem. The first hypothesis of IP and mental health being correlated was supported. Mental health was positively correlated with IP. The second hypothesis of IP and perfectionism being related was also supported. Perfectionism was significantly
related to IP. Additionally, test anxiety was significantly related to IP. The hypothesis of a correlation between IP and self-esteem was not supported. IP and self-esteem were not significantly related. See Table 2 for descriptive variables and Table 3 for a correlation matrix.

We also hypothesized that mental health, perfectionism, test anxiety, and self-esteem would predict IP scores. To evaluate this hypothesis, we used linear regression. The overall model was significant, $R^2 = .43$, $F(5, 486) = 73.16$, $p < .001$. Gender, mental health, perfectionism, and test anxiety were the variables that were significant predictors of the IP, whereas self-esteem was not a predictor of the IP ($p = .43$). See Table 4 for this model.

**Discussion**

In this study, we examined if there were gender differences in IP beliefs. Beyond this, correlations between IP with mental health, perfectionism, test anxiety, and self-esteem were assessed. We found that greater impostor beliefs were endorsed more so by women than by men. Significant results were found between IP and mental health, perfectionism, and test anxiety, but self-esteem was not significantly related to IP.

We found a significant difference between gender and IP scores, which supports previous research (Henning et al., 1998; King & Cooley, 1995; Kumar & Jagacinski, 2006). Women are more likely to have IP beliefs than men. Whereas previous researchers were undecided on gender differences, we were not surprised to find that women reported greater IP beliefs than men. Women have more roles than men and are expected to excel at all of their roles equally, which can lead to impostor feelings (Clance, 1985b; Clance et al., 1995). Harvey and Katz (1985) asserted that people with the IP believe their new roles should be done perfectly. Because women are more likely to have overwhelming demands from multiple roles in their lives than men, a superwoman attitude, where a woman feels she must excel across all areas, may trigger IP beliefs (Clance, 1985b). This idea originates from stereotypic gender roles. Thus, if women internalize these gender roles, they may endorse society’s belief that they are not as successful as men (Langford & Clance, 1993). A theoretical application for these results may be further explained by the attribution theory previously presented by Clance and Imes (1978).

Mental health was significantly correlated with IP, with lower scores of mental health being related to higher scores of the IP. This may indicate that someone with the IP is also likely to have lower mental health than someone without the IP; however, it is necessary to interpret these results with caution, as these findings are correlations based on participants who were recruited with convenience and snowball sampling. Prior researchers revealed IP beliefs were correlated with depression (McGregor et al., 2008; Oleson et al., 2000; Oriel et al., 2004; Ross et al., 2001). This is an important implication when treating an individual with the IP. Although depressive symptoms may be initially more pronounced than IP beliefs, it is imperative to address all symptoms and recognize that cognitive distortions, such as guilt and shame, are characteristic of both depression and the IP (Clance & O’Toole, 1987).

Perfectionism was strongly related to IP scores with higher scores of perfectionism being linked with higher scores of the IP. Test anxiety was also significantly correlated to IP scores with higher scores of test anxiety being related to higher IP scores. These results were expected because prior studies show perfectionistic beliefs to be one of the most commonly endorsed irrational beliefs for people with the IP (Cromwell et al., 1990). Anxiety tends to be an underlying problem in both perfectionism and the IP (Cromwell et al., 1990); thus, this correlation was anticipated. People who endorse IP are notorious for striving for perfectionism, and when individuals with the IP invest excessive effort to meet perfection, it can cause additional anxiety (Parkman & Beard, 2008). Elements of perfectionism are more pronounced and common in people with IP feelings than people who do not endorse IP, such as high standards and self-critical thoughts (Thompson et al., 1998).

Test anxiety was also related to the IP (Kumar

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**TABLE 2**

<table>
<thead>
<tr>
<th>Descriptive Variables for IP, GHQ, CAPS, TAI, and RSE</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>58.68</td>
<td>13.87</td>
<td>26–98</td>
</tr>
<tr>
<td>GHQ</td>
<td>33.25</td>
<td>6.52</td>
<td>13–47</td>
</tr>
<tr>
<td>CAPS</td>
<td>42.34</td>
<td>10.09</td>
<td>15–69</td>
</tr>
<tr>
<td>TAI</td>
<td>10.92</td>
<td>4.59</td>
<td>5–20</td>
</tr>
<tr>
<td>RSE</td>
<td>30.26</td>
<td>6.19</td>
<td>20–46</td>
</tr>
</tbody>
</table>

Note: Correlations for participants ($N = 506$) are presented above. Higher scores indicate greater magnitude. GHQ = General Health Questionnaire; CIPS = Clance Imposter Phenomenon Scale; CAPS = Child and Adolescent Perfectionism Scale; TAI = Test Anxiety Inventory; RSE = Rosenberg Self-Esteem Scale.
This finding is not surprising because the IP has roots in anxiety (Langford & Clance, 1993). A possible explanation for individuals with the IP to have elevated levels of test anxiety could be attributed to the fact that people who endorse IP are likely to have lower levels of academic efficacy (Thompson et al., 1998). Perfectionism and test anxiety may be related because perfectionism is embedded in anxiety issues and because individuals with the IP are likely to view intelligence in a fixed viewpoint. If their skill sets are not aligned with their idea of intelligence, they may be unable to internalize success (Langford & Clance, 1993).

Matthews and Clance (1985) posed the question of what constitutes real success and genuine achievement. This leads one to question what individuals with IP define as success. Are they so high-achieving that perfection is the standard? If this is the case, it could explain why people who endorse IP cannot internalize their success because perfection is often unattainable. Along the same lines of test anxiety, in a broader sense, individuals with the IP are prone to have high anxiety in general (Clance & O’Toole, 1987; Oriel et al., 2004). Personality traits such as neuroticism and introversion, which are related to anxiety, could be a potential explanation for the IP and perfectionism (Ross & Krukowski, 2003).

No significant relationship was found between self-esteem and the IP. This was the opposite of what was hypothesized because prior research found low self-esteem as a predictor of the IP (Ross & Krukowski, 2003; Sonnak & Towell, 2001). Some researchers argue that there is too much overlap in low self-esteem and the IP as psychological concepts to analyze the two concepts separately (Cozzarelli & Major, 1990; Fried-Buchalter, 1992). The nonsignificant results could be explained through bias with self-report measures and social desirability. Kolligan and Sternberg (1991) found that self-esteem was strongly, negatively correlated with fraudulent feelings and positively correlated with depression. Low self-esteem could be also interconnected with the IP and depression to yield significant results for the current study. Even though low self-esteem was not significantly related to the IP, it is pertinent to recognize that other research has found it correlated with the IP. This knowledge is applicable to treating the IP because if an individual has IP beliefs, it is important to establish good self-esteem in hopes that they learn how to internalize accomplishments and self-worth (Langford & Clance, 1993).

Our sixth hypothesis was supported. We wanted to determine whether mental health, perfectionism, test anxiety, and self-esteem were significant predictors of impostor beliefs. Although the overall model was significant, only mental health, perfectionism, and test anxiety significantly predicted the IP. This is not surprising, as IP scores have been linked to more mental health problems in previous research (Oriel et al., 2004; Ross & Krukowski, 2003; Ross et al., 2000). Specifically, depression was a strong predictor of the IP (Oleson et al., 2000). It would be interesting to discover what aspects of mental health contribute to the IP in future studies. Additionally, Clance stated that many individuals with the IP hold perfectionist beliefs (1985a).

Thompson et al. (1998) found that individuals with the IP held higher standards and reported more anxiety than individuals without the IP. Because of this relationship between perfectionism and anxiety (Thompson et al., 1998), the fact that these two variables significantly predicted IP scores was expected.

Self-esteem was not a predictor of the IP. This could be because IP and self-esteem are not independent constructs, as Fried-Buchalter (1992) and Cozzarelli and Major (1990) suggested. These results are interesting for treating individuals with impostor beliefs because clinicians should be aware that mental health, perfectionism, and anxiety contribute to more IP feelings. Treatment outcomes may be more successful if the therapist is cognizant that these variables are closely related to each other and predictors of the IP so that the individual receives care for all of the potential comorbid effects. Because self-esteem and the IP may not be exclusive constructs, treatment considering mental health, perfectionism, and test anxiety significantly predicted the IP.

Table 3: Summary of Correlations, Means, and Standard Deviations for Scores on IP, GHQ, CAPS, TAI, and RSE

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CIPS</td>
<td>–</td>
<td>–0.48*</td>
<td>–0.48*</td>
<td>0.50**</td>
<td>–0.47</td>
</tr>
<tr>
<td>2. GHQ</td>
<td>–</td>
<td>–0.30*</td>
<td>–0.32**</td>
<td>–0.32**</td>
<td>–0.03</td>
</tr>
<tr>
<td>3. CAPS</td>
<td>–</td>
<td>–0.35**</td>
<td>–0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. TAI</td>
<td>–</td>
<td>–0.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. RSE</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>58.68</td>
<td>33.25</td>
<td>24.34</td>
<td>10.92</td>
<td>30.26</td>
</tr>
<tr>
<td>SD</td>
<td>13.87</td>
<td>6.52</td>
<td>10.09</td>
<td>4.59</td>
<td>6.19</td>
</tr>
</tbody>
</table>

Note: Correlations for participants (N = 506) are presented above. Higher scores indicate greater magnitude. GHQ = General Health Questionnaire; CIPS = Clance Imposter Phenomenon Scale; CAPS = Child and Adolescent Perfectionism Scale; TAI = Test Anxiety Inventory; RSE = Rosenberg Self-Esteem Scale. All analyses were two-tailed.

*p < .05, **p < .01, ***p < .001.
all the factors (the IP, mental health, perfectionism, and anxiety) could result in improvement of an individual’s self-esteem as well.

One of the positive outcomes of this study is that it furthers research on the IP, which is a relatively new psychological construct with just over 30 years of research. It is valuable to gather information on psychological constructs that are correlated with the IP because it gives a more comprehensive understanding of the phenomenon. Additionally, this study had good ethnic diversity. Although the majority of the sample was composed of White American participants (64.4%), this percentage is just over half of the sample, which was of an adequate size (506 participants). Therefore, these numbers show that our sample was ethnically diverse.

Whereas the sample size and various racial groups represented are positive aspects of this study, the limitations should be kept in mind when interpreting the data. Ninety-two percent of participants were between the ages of 17–24, so these results may not be generalized to other age groups. Also, most of the participants in this study were women (79.2%). It would be interesting to see if the results would replicate with a more gender balanced sample. Lastly, as always with self-report data, it is critical to read results cautiously, as people may not respond accurately.

Because the IP is a recent phenomenon, results have remained inconsistent in what predicts the IP and which factors are associated with the IP. Thus, further research is necessary. A future study might consider using physiological measurements in conjunction with self-report measures of stress and test-anxiety and contrast these differences between people who endorse IP and people who do not endorse IP. If there were significant differences in the physiological measurements, such as heart rate and blood pressure, between people who endorse IP and people who do not endorse IP, this would strengthen self-report data and offer less disputable results. Additionally, as some researchers believe that the IP originates from gender stereotypes (Clance et al., 1995), it might be worthwhile for future research to determine if there are differences between impostor feelings for women who identify themselves as feminists and those who do not identify as feminists. Along similar lines of gender, it would be interesting to study IP beliefs in a sample that consists of both lesbian and heterosexual women. We predict that lesbian women would report lower IP scores than heterosexual women because there is more fluidity in gender roles in the lesbian, gay, bisexual, and transgender (LGBT) community (Blashill & Powlishta, 2009).

In conclusion, there is valuable information to be taken from this study. Gender, mental health, perfectionism, and test anxiety were all significantly related to IP beliefs. Although self-esteem was not significantly correlated with the IP, this contradicts prior research, so further research should be conducted for clarification. The IP is a relevant topic to research because it is pervasive to many women in academic and professional settings, and associated with other serious psychological problems.

### TABLE 4

<table>
<thead>
<tr>
<th>Predictors of Imposter Phenomenon</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>$B$</td>
<td>Lower 95% CI</td>
<td>Upper 95% CI</td>
<td>$t$</td>
<td>$p$</td>
</tr>
<tr>
<td>Gender</td>
<td>2.50</td>
<td>[0.19, 4.80]</td>
<td>0.74</td>
<td>2.12</td>
<td>.034</td>
</tr>
<tr>
<td>Mental Health</td>
<td>-0.61</td>
<td>[-0.76, -0.45]</td>
<td>-0.29</td>
<td>-7.78</td>
<td>.001</td>
</tr>
<tr>
<td>Perfectionism</td>
<td>0.39</td>
<td>[0.29, 0.49]</td>
<td>0.29</td>
<td>7.63</td>
<td>.001</td>
</tr>
<tr>
<td>Test Anxiety</td>
<td>0.88</td>
<td>[-0.66, 1.11]</td>
<td>0.29</td>
<td>7.74</td>
<td>.001</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>-0.51</td>
<td>[-0.30, 0.12]</td>
<td>-0.03</td>
<td>-0.83</td>
<td>.407</td>
</tr>
</tbody>
</table>

Note. $R^2 = .43$ ($N = 506, p = .001$). CI = Confidence Interval for $B$. This table shows 95% confidence intervals for $B$.
The impostor phenomenon and personality characteristics of high school honor students. Journal of Social Behavior and Personality, 5, 563–573.


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Facial Expression: The Ability to Distinguish Between Enjoyment and Nonenjoyment Smiles

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ABSTRACT. The smile is a universally recognized facial expression generally associated with happiness. However, this may not always be the case and discerning the difference is surprisingly difficult. Enjoyment smiles involve the involuntary contraction of the orbicularis oculi, which lifts the cheeks and narrows the eyes, and the zygomaticus major, which raises the lip corners. Nonenjoyment smiles only use the zygomaticus major (Frank & Ekman, 1993). In the current study, participants watched Facial Action Coding System (FACS) coded videos of smiles and were asked whether they believed the smiles were real or fake. Tobii X120 eye-tracking software was used to determine the most focused upon facial muscle when interpreting the smiles. It was estimated that the majority of participants would perform at a level slightly above chance, achieve an average of 60% accuracy, and pay most attention to the zygomaticus major (Ekman & Friesen, 1982; Frank, Ekman & Friesen, 1993). Results indicated that the majority of the participants performed significantly above chance, with an average 65% accuracy, and focused on the orbicularis oculi. These findings suggest that the ability to detect smiles is increasing and people tend to look at the eyes rather than the mouth during a smile.

The most frequently used and most easily recognized facial expression is the smile (Ekman, 2009). However, simply because a person is smiling doesn’t always mean they are happy. Like other facial expressions, smiling can be produced spontaneously or deliberately. Spontaneous smiles are most commonly referred to as enjoyment smiles and are produced in response to emotional stimuli (Darwin & Ekman, 2009; Duchenne & Cuthbertson, 1990; Ekman 2009; Ekman & Friesen, 1982; Ekman, Hager & Friesen, 1981; Hager & Ekman, 1985). They involve the presence of the orbicularis oculi, the facial muscle surrounding each eye socket (Figure 1), in conjunction with the zygomaticus major, the facial muscle extending from each cheekbone to the corners of the mouth (Figure 2). In an enjoyment smile, the lip corners are pulled upward, the cheeks are lifted, and the eyes are narrowed producing wrinkles commonly referred to as crow’s feet (Frank & Ekman, 1993). Deliberate smiles are produced by voluntarily contracting the zygomaticus major muscles, which reach from the cheekbone to the corners of the lips and are called nonenjoyment smiles. The present manuscript focuses on answering the following questions: Can enjoyment and nonenjoyment smiles be interpreted? If so, at what level of accuracy? And what facial feature is the most helpful in making that distinction?

The Human Smile
In the mid 19th century, the French neurologist
G. B. Duchenne noted that there was more than one way to smile and that only one of these smiles was accompanied by positive emotions (Duchenne & Cuthbertson, 1990). He went on to say that the emotion of frank joy is expressed on the face by the contraction of the zygomaticus major muscle and the orbicularis oculi. In Ekman’s reprinted edition of Charles Darwin’s book, *The Expression of the Emotions in Man and Animals* (Darwin & Ekman, 2009), Darwin noted that Duchenne’s findings seemed to be apparent in both humans and animals, with only one type of smile expressing joy in all species. Due to his extensive research on the topic, Darwin is credited with noting the importance of the presence of the orbicularis oculi in spontaneous smiles and its absence in deliberate smiles.

Landis (1924a; 1924b) showed that across sixteen different situations ranging from listening to popular music, looking at pornography, smelling ammonia, receiving an electrical shock, to watching the decapitation of a live rat, the smile was the most frequent facial expression. He reported that people smile regardless whether they feel anger, disgust, exasperation, revulsion, or sexual excitement and eventually concluded that the smile was a misleading and meaningless indicator of emotion.

Cultural anthropologists found similar results while observing smiles in different cultures. For example, Africans were described as people who not only use the smile to express enjoyment, but surprise, wonder, embarrassment, and discomfort (LaBarre, 1947). Another anthropologist described that early on he was fascinated with human universals. After studying the human smile, he concluded that the search for universals was culture bound and that there are probably no universal facial symbols of emotion (Birdwhistell, 1963; 1990). These anthropologists concluded that the meaning of the smile was culturally determined and that there were no universal facial expressions of emotion and, in particular, facial expressions of enjoyment did not exist. However, because these researchers did not specify which smiles featured only the zygomaticus major muscle and which smiles featured both the zygomaticus major and the orbicularis oculi, they were unable to confirm or disconfirm Duchenne’s original observations.

Beginning in the early 1980’s, Ekman and Friesen began to rediscover and validate Duchenne’s theories. They abandoned their Facial Affect Scoring Technique (FAST; Ekman, Friesen & Tomkins, 1971) and decided to use the Facial Action Coding System (FACS; Ekman & Friesen, 1984), invented in 1978, to evaluate and assess universal facial expressions in emotions. They did so by photographing and recording the facial muscles and noting how these muscles could be manipulated during the different states of emotion.

In an effort to make learning and discussing the structures in the face less difficult, Ekman and Friesen categorized all of the facial nerves and muscles into 44 Action Units (AU) in the FACS. Any facial movement can be described in terms of the particular action unit, or units, that it activates. For example, the zygomaticus major muscle (musculus zygomaticus major) is coded as AU 12 and the orbicularis oculi (pars orbitalis) is coded as AU 6. Thus an enjoyment smile is coded as AU 12 + AU 6. There is one more action unit that goes into an enjoyment smile and that is the separation of the lips (AU 25, depressor labii inferioris). However, due to the fact that this action is also present in nonenjoyment smiles it is not considered to be a distinguishing feature of smiling (Ekman & Rosenberg, 2005). Henceforth, in this paper, all smile features will be referred to in terms of enjoyment and nonenjoyment smiles.

![Orbicularis Oculi](Image1)

![Zygomaticus Major](Image2)
of their Action Units instead of their Latin names.

**Smile Types**

Spontaneous smiles were originally called *felt smiles* until 1982 when Ekman and Friesen changed the term to the *enjoyment smile* because of the controversy over whether people were actually aware of the smile when it occurred. Later on, Ekman suggested that the enjoyment smile be called the *Duchenne smile* in honor of Duchenne’s work (Ekman, 1989; 1990). To avoid any unnecessary confusion the term enjoyment smile will henceforth be used in this paper when referring to a smile elicited by positive emotion that uses both the orbicularis oculi and the zygomaticus major muscle, with the term nonenjoyment smile referring to all other types of smiles.

In his book on human emotions and behaviors, Ekman (2009) defined 18 different types of smiles with only one of these, the enjoyment smile, accompanying positive emotions. Some of the more popular nonenjoyment smiles include the *phony smile*, in which the person pretends to show positive emotions when in reality no emotion is felt. The *masking smile* is an attempt to cover the person’s negative emotions. The *dampened smile* occurs when the person feels positive emotions but attempts to appear as if those feelings are less intense. Finally, the *gestural* or *polite smile*, is a smile that might be seen when someone receives an unappreciated gift and does not want the giver to feel bad (Ekman & Friesen, 1982; Ekman, 2009).

People smile when they are happy or when they like a certain individual (Ekman, 1992; 1994). People also smile when they feel embarrassed (Kraut & Johnston, 1979), uncertain (LaBarre, 1947), and sad (Klineberg, 1962). Regardless of intent, individuals who smile are perceived as being happier (Otta, Abrosio & Hoshino, 1996; Otta, Lira, Delevanti, Cesar & Pires, 1994), more attractive, kind, honest, and competent (Hess, Beaufre & Cheung, 2002; Reis et al., 1990), and are better liked (Palmer & Simmons, 1995; Young & Beier, 1977) than people who do not smile.

Enjoyment smiles have been found to have a number of distinctive features apart from AU 12 and AU 6. Some of these features include the *onset*, which is the time it takes the face to move from a neutral expression to the highest peak of a smile. The *apexis* the amount of time a smile is held at its peak. The *offset* is the time it takes the face to move from the highest peak of a smile back to a neutral expression. The *duration* is the total time it takes the face to move from onset to offset.

Compared to nonenjoyment smiles, enjoyment smiles tend to be shorter in total duration, generally lasting between two-thirds of a second to four seconds (Hager & Ekman, 1985; Hess & Kleck, 1990), and have longer onset and offset times which range from one-half to three-quarters of a second (Hess & Kleck, 1990; Schmidt, Bhattacharya & Denlinger, 2009; Schmidt, Cohn & Tian, 2003). Smiles are perceived as being more genuine when they have longer onset and offset times and shorter apex times (Ekman & Friesen, 1982; Krumhuber & Kappas, 2005). Conversely, nonenjoyment smiles have been found to have total durations generally longer than 4 s (Hager & Ekman, 1985) and shorter onset and offset times (Hess & Kleck, 1990; Schmidt, Ambadar, Cohn & Reed, 2006; Weiss, Blum & Gleberman, 1987).

Enjoyment smiles are significantly more symmetrical than the multiple nonenjoyment smiles (Lynn & Lynn, 1938, 1943). This asymmetry of nonenjoyment smiles is more prominently displayed on the left side of the face compared to the right, which suggests greater involvement of the right cerebral hemisphere in false emotions (Ekman, Hager, & Friesen, 1981; Hager & Ekman, 1985). Fox and Davidson (1987; 1988) examined this relationship using 10-month-old infants. Using electroencephalography (EEG) to measure brain activity, they found that enjoyment smiles were associated with more anterior (frontal) activation of the left cerebral hemisphere compared to other types of smiles, which were associated with anterior activation of the right cerebral hemisphere. This confirms the notion that the right cerebral hemisphere is greatly involved with false emotions, especially smiles. Ekman, Davidson, and Friesen (1990) were the first to examine this relationship in adults. They found that, when participants portrayed enjoyment smiles, there was slightly greater activity in the left parietal lobe than any other lobe of the brain. Conversely, when participants portrayed nonenjoyment smiles, there was significantly greater activity in the right anterior temporal and parietal lobes.

In general, the functions of each hemisphere of the brain are contralaterally related to the body (Ekman et al., 1990). In other words, the right side of the brain controls the left side of the body and the left side of the brain controls the right side of the body. Nonenjoyment smiles are associated with the right cerebral hemisphere (Ekman et al., 1981; Hager & Ekman, 1985). This explains why they are
asymmetrical on the left side of the face. Enjoyment smiles activate the left cerebral hemisphere (Fox & Davidson, 1987, 1988; Ekman et al., 1990), thus moving the right side of the face and equalizing the facial muscles used in smiling thereby producing a symmetrical enjoyment smile.

Detecting Smiles
Frank and colleagues (1993) were the first to test whether enjoyment smiles could be distinguished from nonenjoyment smiles. Previous studies involving smiles examined how well observers could detect deception and noted that smiles were present whether the confederates told the truth or lied. They combined all forms of smiling into one category and did not determine whether enjoyment smiles could be distinguished from the many types of nonenjoyment smiles. Instead, they concluded that the presence of a smile is not a telltale cue for whether or not someone is being deceptive (DePaulo, Stone & Lasater, 1985; Zuckerman, DePaulo & Rosenthal, 1981; Zuckerman & Driver, 1985).

When detecting deception, people are correct at an average of 50% of the time with very few performing at an above chance level (Ekman & Friesen, 1974, 1982; Ekman, Friesen & O’Sullivan, 1988; Ekman & O’Sullivan, 1991; Hess & Kleck, 1994). A recent meta-analysis of over 250 studies explained that the average person is only correct 53% of the time when attempting to determine whether or not someone is telling the truth (Bond & DePaulo, 2006). However, when distinguishing between enjoyment and nonenjoyment smiles, individuals perform at a slightly above chance level with an average of 60% accuracy (Ekman & Friesen, 1982; Frank et al., 1993). These results are similar in both men and women.

There are developmental considerations in detecting emotion. Frank et al. (1993) found that adults were sensitive to AU 12 when detecting smiles. In addition, 9- and 10-year-old children were sensitive to AU 12 when detecting enjoyment smiles, but 6- and 7-year-old children were not (Gosselin, Beaupre & Boissonneault, 2002; Gosselin, Perron, Legault & Campanella, 2002; Saarni, Mumme & Campos, 1998). Josephs (1994) found that 4- and 5-year-old children were able to correctly match a character’s face with the expressed emotion. Banerjee (1997) tested 3-year-old children and found similar results. This supports earlier findings that the ability to distinguish emotions increases with age, which holds true until age 40.

when performance begins to decrease (Ekman & O’Sullivan, 1991; O’Sullivan, 2005; O’Sullivan & Ekman, 2004). It is important to note that these studies relied on self-report or experimenter observation instead of an eye-tracking device when determining the action unit to which participants were most sensitive.

The current study was focused exclusively on the ability to distinguish between enjoyment and nonenjoyment smiles rather than whether or not someone was telling the truth. Participants were tested to determine their accuracy in this interpretation and the use of an eye-tracker was incorporated, in addition to self-report, so that the action unit to which participants’ were the most sensitive could be accurately determined. As based on previous research, the current hypothesis stated that the majority of participants would perform at a slightly above chance level, with the average accuracy rating being 60%, that men and women would achieve about the same level of accuracy, and that they would be most sensitive to AU 12.

Method
Participants
Participants consisted of 66 students and faculty members at a Midwestern university (21 men and 45 women) ranging from 18 to 65 years of age ($M = 24.5, SD = 9.8$). Ethnicity of the participants was as follows: 56 White, 4 Black, 4 Asian, 1 Native American, and 1 Middle Eastern. The original sample recruited was 87; however, 21 participants were not included in the analysis, because 4 were not tracked properly when watching the videos, and 17 could not be calibrated at all. The majority of the participants reported majors in the social and natural sciences with some of them in the arts and humanities, business and industry, and education and human services. The study was reviewed and approved by the Institutional Review Board (IRB) and no compensation other than the possibility of extra credit was given for participating in the study.

Materials
The materials used in this study were 20 FACS coded videos, each of which depicted a person smiling (13 men and 7 women) for an average of 4 s each. Ten of the videos showed enjoyment smiles (8 men and 2 women) and 10 showed nonenjoyment (5 men and 5 women). Eighteen of the videos depicted White actors (12 men and 6 women), one depicted a Black actor (man), and one depicted an Asian actor (woman). The videos showed each of...
Enjoyment and Nonenjoyment Smiles

the different phases in the smile (onset, apex, and offset) and were obtained from the BBC Science and Nature Web site (BBC, n.d.). Each video was uploaded into Tobii X120 infrared eye-tracking software so that the area of the smile participants spent the most time looking at could be recorded. The videos were presented in randomized order for each participant to help eliminate the possibility of order effects or confounding variables.

Procedure

Once informed consent was obtained, participants’ eyes were calibrated with Tobii eye-tracking software, so that it could accurately follow their movements. This procedure took about two minutes to complete after which, participants were given instructions using the following script:

You will now watch a series of video clips each depicting a smile. The first video is a practice video that does not affect the study, so you may answer in any way you like. After that please choose the answer that best represents the question. Be sure to watch each video carefully, because it will only be played one time. Are you ready to begin?

The independent variable was smile type and had two levels: enjoyment (real) and nonenjoyment (fake). The dependent variable was the percentage of the videos that each participant identified correctly. Each participant was individually tested. When they finished watching the videos, they were given a short demographics questionnaire that asked them their age, sex, ethnicity, area of study or their career as well as an open ended question that asked where they looked while interpreting smiles. All questions were multiple-choice with the exception of age, ethnicity, and career, which were open responses. After this was completed, they were thanked for their participation and given a debriefing form.

Results

A nonparametric binomial sign test showed that the amount of participants (80%) who performed at an accuracy level above chance (50%) was significant ($p < .001$). To expand upon this finding, a second nonparametric binomial test was conducted setting a cutoff at 60% accuracy, or slightly above chance. Results indicated that the amount of participants (67%) who performed at an accuracy level slightly above chance (60%) was significant ($p = .009$). Descriptive statistics on the average percent correct for each participant showed that, overall, participants were correct 65% of the time in distinguishing between enjoyment and nonenjoyment smiles.

A 2 (participant sex) x 2 (actor sex) x 2 (smile type) analysis of variance (ANOVA) was conducted on the percent correct for each video. Results showed no significant effect of participant sex, $F(1, 40) = 0.07, p = .79, \eta^2 = .002$, with nearly equal performance between men and women, 64.1% vs. 65.0%. Enjoyment smiles and nonenjoyment smiles were equally readable, $F(1, 40) = 0.89, p = .35, \eta^2 = .027$ with participants achieving a 65.9% accuracy rating on enjoyment smiles and 63.2% on nonenjoyment smiles. There was no significant effect of the sex of the actor in the video, $F(1, 40) = 1.39, p = .25, \eta^2 = .042$. However, participants gave slightly more accurate responses to the videos that depicted the face of a woman ($M = 67.6\%$) compared to that of a man ($M = 62.9\%$).

Tobii eye-tracker analyses and the participants’ self-report of where they looked while watching the videos showed that the 33 participants who were correct in distinguishing enjoyment and nonenjoyment smiles at an accuracy rate of over 70% spent the majority of their time focused on AU 6 (Figure 3). Conversely, the 13 participants who performed at an accuracy rate of 50%, or lower, spent the majority of their time focused on AU 12 (Figure 4). This was true across participant and actor sex.

In order to find a more general statistic, an independent samples $t$ test was conducted to compare the total amount of time, in seconds, that participants spent looking at AU 6 and AU 12. When both smile types were examined together results indicated that participants spent significantly more time looking at AU 6 ($M = 1.29, SD = 0.08$), compared to AU 12 ($M = 0.89, SD = 0.38$), $t(38) = 4.62, p < .001$ (Table 1). When examined separately, data showed that this significance was more prominent in enjoyment smiles, during which participants looked at AU 6 ($M = 1.29, SD = 0.08$) significantly more than AU 12 ($M = 0.92, SD = 0.17$), $t(18) = 4.04, p = .001$ (Table 1), than in nonenjoyment smiles during which participants spent significantly more time looking at AU 6 ($M = 1.29, SD = 0.14$) compared to AU 12 ($M = 0.85, SD = 0.05$), $t(18) = 2.85, p = .01$ (Table 1). These findings suggest that when observing either enjoyment or nonenjoyment smiles, both men and women look at AU 6 more than AU 12.

According to the self-report data, 75% of the
participants in the current study reported looking at the eyes (AU 6), 10% reported looking at the mouth, (AU 12) and 5% reported the face in general terms. However, according to the eye-tracking data, some of the participants who reported looking at the eyes focused on the mouth and other parts of the face. In addition, about one-fourth of these participants performed around the level of 50%, suggesting that they did not really know what they were looking for. This suggests that self-report of where the participants’ believed they looked when interpreting smiles is not a very reliable measure.

A multiple regression analysis was conducted to evaluate how well each of the selected independent variables predicted participants’ ability to accurately detect smiles. The predictors were the selected variables of age, participant sex, ethnicity, area of study (arts and humanities, business and industry, education and human services, social and natural sciences), and career (undergraduate student, graduate student, professor, lawyer, social worker) and the indicator variable was the percentage of smiles that were correctly identified. The linear combination of selected variables was not significantly related to the percent correct, $F(5, 60) = 1.88, p = .111$. The sample multiple correlation coefficient was 0.14, indicating that approximately 7% of the correctly identified smiles could be accounted for by the linear combination of selected variables. The coefficients showed that ethnicity was significant ($p = .005$) and the more participants in an ethnic group, the better the group performed. Thus, White participants performed significantly better than others. However, this is most likely due to the unbalanced sample, and as a result, further analysis was not conducted. Age ($p = .258$), participant sex ($p = .576$), area of study ($p = .476$), and career ($p = .493$) were not significant predictors of a person's ability to distinguish enjoyment from nonenjoyment smiles.

**Discussion**

This study was conducted under the hypotheses that the majority of the participants would perform at slightly above chance level in their ability to distinguish enjoyment and nonenjoyment smiles. Specifically, it was hypothesized that the average accuracy rating across participants would be 60% with no significant difference in performance between men and women, and that participants would be most sensitive to the Facial Action Coding System action unit 12, the zygomaticus major muscle (Ekman & Friesen, 1982; Frank et al., 1993).

The significant finding that 80% of the participants performed at an accuracy level above chance is a new finding that supports previous research and the current hypothesis. Previous studies showed that the majority of participants performed at an above chance level, but they did not statistically specify this majority. The significant finding that 67% of the participants performed at a level above 60% accuracy is also a new finding. This significance extends upon previous work in that 60% was the overall accuracy rating found in previous studies. Therefore, the 65% average accuracy rating achieved by participants in the current study is contradictory to previous research and the current hypothesis (Ekman & Friesen, 1982; Frank et al., 1993).

According to eye-tracking data and the independent samples t test, both men and women in the sample spent significantly more time focusing on AU 6 compared to AU 12 when looking at both enjoyment and nonenjoyment smiles (Figures 3 and 4). This difference was more marked for the enjoyment smiles and was contradictory to previous research, which stated that participants focused on AU 12 significantly more than AU 6 (Ekman & Friesen, 1982; Frank et al., 1993; Krumhuber & Manstead, 2009). This could be explained by the fact that AU 6 is active in enjoyment smiles and in absent in nonenjoyment smiles. In addition, the eye-tracking data of the 33 participants who performed above 70% showed that they spent the majority of their time focused on AU 6 in both enjoyment and nonenjoyment smiles (Figure 3). The eye-tracking data was opposite for the 13 participants who performed at, or below, 50% (Figure 4), which suggests that the participants who achieved 70% or higher were noting the absence...
AU 6 in nonenjoyment smiles, and those who performed at or below 50% were not.

A number of different explanations could be given as to why this contradiction occurred. The first one is that previous studies did not incorporate the use of an eye-tracking device and relied solely on the participants’ self-report and experimenter observation. As the analysis of self-report showed, even though most of the participants in the current study reported looking at the eyes some of them focused on other parts of the face. In addition, about one-fourth of the participants who reported looking at the eyes performed around the level of chance, suggesting that they did not really know what they were looking for. Nevertheless, data showed that the overall focus was on AU 6 rather than AU 12, which is contradictory to previous studies. This suggests that self-report is not a very reliable measure and that the use of an eye-tracking device is essential in determining the area of the face that is most focused upon when detecting emotion.

The hypothesis was confirmed when a repeated measures analysis of variance (ANOVA) was conducted on participant sex. As previous research suggested, the results revealed no significant differences in performance ability among men and women (Ekman & Friesen, 1982; Ekman & O’Sullivan, 1991; Ekman & Friesen, 1993). Additional findings showed that both enjoyment and nonenjoyment smiles were equally readable by participants. This finding contradicts previous research, which said that enjoyment smiles are easier to read based on the fact that there is only one type of enjoyment smile and many different nonenjoyment smiles (Duchenne & Cuthbertson, 1990; Ekman, 2009; Ekman & Friesen, 1982; Gosselin, Beaupre, et al., 2002; Gosselin, Perron et al. 2002). However, current research showed that both types of smiles were interpreted with about the same level of accuracy.

In addition, the sex of the actor in the video had no significant effect on the participants’ responses. However, the faces of female actors were slightly easier to read than those of male actors. This could potentially be explained by the finding that women are better at physically expressing their emotions than men (Ekman, Roper & Hager, 1980).

Limitations
Although the multiple regression analysis showed a significant effect among the ethnicity of the participant, that was most likely because there were unequal numbers of participants across ethnic groups, with minimal representation across groups. Thus, if the ethnic groups were balanced, the results may have turned out differently. In addition, the sample sizes of men and women were not ideally balanced. There were roughly twice as many women as there were men (45 to 21). Due to the nearly equal performance between men and women, it is likely that a balanced sample would yield similar results.

One of the major limitations in this study was that the stimuli were not balanced. Across 20 videos, 65% (n = 13) depicted a male actor and 35% (n = 7) depicted a female actor. However, the faces of women were more accurately rated than those of men. Therefore, this imbalance may have suppressed potentially significant findings. Another complication with the stimuli was that there were more male enjoyment (n = 8) smiles than female (n = 2) enjoyment smiles. Once again, the faces of women were more accurately rated than those of men. Due to the fact that there were one-fourth as many female enjoyment smiles, this finding could remain or become significant if a balanced sample were used.

Perhaps the most important limitation to note is that the videos in this study might not have been perfect representations of enjoyment and nonenjoyment smiles. Specifically, the onsets and offsets of these smiles may no longer be an accurate representation of emotion. New research is being conducted specifically on the durations of smiles, and the findings indicate that the duration of onset and offset times, specifically in enjoyment smiles, may be different than those depicted in the videos used in the current study. However, until
the significance of this research is made known, the onset and offset times in the videos used in the current study are assumed to be accurate (C. Freshman, personal communication, January 8, 2012).

Finally, even though the use of the Tobii eye-tracking system was very beneficial to this study, there were some drawbacks that caused the data of 21 participants to be discarded. This could have happened for any number of reasons such as the lighting in the room, the participant’s vision level, or the distance from the eye-tracker. In any case, it was clearly more beneficial to use the eye-tracker and cope with its limitation than to avoid using it at all.

Future Research
Some other interesting possibilities would be to examine the smile recognition ability of children and infants using eye-tracking software and using them as actors in the stimuli. The comparison between children, infant, and adult faces could be made to find out if certain age groups are better at reading people, or are easier to read than others. It would be interesting to find out if the sex of the children and infant actors would have an effect on the interpretation of their smile similar to the finding in this study.

In addition to inherent traits, life experiences may also determine peoples’ ability to detect emotion. Several studies have mentioned that socially excluded individuals tend to notice emotion faster than nonsocially excluded individuals (Bernstein, Sacco, Brown, Young & Claypool, 2010; Bernstein, Young, Brown, Sacco & Claypool, 2008; DeWall, Maner & Rouby, 2009; Maner, DeWall, Baumeister & Schaller, 2007). In addition, children from abusive families averted their eyes when seeing nonenjoyment smiles and elevated their gaze when seeing enjoyment smiles, whereas children from nonabusive families displayed no significant gaze difference (Bugental, Kopeikin & Lazowski 1991). However, research has not yet determined whether socially excluded or abused individuals are more accurate at distinguishing smiling.

Given the fact that AU 6 and AU 12 are the two primary features in a smile, it would be interesting to find out if participants would still be able to distinguish between enjoyment and nonenjoyment smiles if one portion of the face was covered, and at what level. Often, individuals are only able to see parts of the face through masks, bad camera angles, restricted views, et cetera. If the most expressive part of the face could be determined it may be of considerable importance to criminal investigators and law enforcement officials. For example, would participants continue to perform significantly higher than chance if they only observed AU 6? Based on the findings in this study, it would seem that, if one were to focus exclusively on AU 6, then they would have much greater accuracy. Conversely, would they perform significantly lower than chance if they only observed AU 12? Again, the findings in the current study indicated that focusing on AU 12 was associated with lower accuracy in distinguishing enjoyment and nonenjoyment smiles.

In conclusion, the main findings in this study were contradictory to previous work and the current hypothesis. The finding that significantly more participants achieved an accuracy rating of over 60% is contradictory to previous work and the current hypothesis, neither of which foresaw this significance. It can also be considered a new finding in that previous studies have not tested for this significance. In addition, participants in the current study had an overall accuracy rating of 65%, which is not only higher than chance, but also higher than the average accuracy rate of 60% found in previous research. The most surprising finding was that most people focused on AU 6 rather than AU 12, which was contrary to previous research and the current hypothesis. The reason behind this finding could be that previous studies did not incorporate the use of an eye-tracker. It is very possible that people have always looked at the eyes and have simply reported looking at the mouth due to the fact that the mouth displays smiles. One last finding that was not incorporated in the current hypothesis was that enjoyment and nonenjoyment smiles were equally readable. This contradicts previous research, which said that enjoyment smiles are easier to read than nonenjoyment smiles. In the end there are many questions that have yet to be answered, and continued research should be conducted incorporating.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Average Time (in Seconds) Spent Looking at Action Units in 10 Enjoyment and 10 Nonenjoyment Smiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle &amp; Smile Type</td>
<td>Time</td>
</tr>
<tr>
<td>AU6 Enjoyment</td>
<td>1.43</td>
</tr>
<tr>
<td>AU6 Nonenjoyment</td>
<td>1.22</td>
</tr>
<tr>
<td>AU12 Enjoyment</td>
<td>1.10</td>
</tr>
<tr>
<td>AU12 Nonenjoyment</td>
<td>0.81</td>
</tr>
</tbody>
</table>
the use of eye-tracking software instead of, or in addition to, self-report to determine the most helpful feature in distinguishing enjoyment and nonenjoyment smiles.

References


Author Note. Spencer A. Coffman, Department of Psychology, Minnesota State University Moorhead. Spencer Coffman is now conducting independent research on micro-expressions and deception.

A special thanks to Dr. Elizabeth Nawrot and Dr. Magdalene Chalikia for their guidance and support in the preparation of this manuscript.

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## PSI CHI AWARDS

Psi Chi sponsors a variety of award competitions each year. Listed below is a brief overview. For more information, please visit [www.psichi.org/Awards](http://www.psichi.org/Awards)

<table>
<thead>
<tr>
<th>Name of Award</th>
<th>Description of Award</th>
<th>Submission Deadline</th>
<th>Who Can Apply?</th>
<th>Award Amount/ Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandura Graduate Research Award</td>
<td>Awards the student submitting best overall empirical study; cosponsored by APS</td>
<td>February 1</td>
<td>• Graduate</td>
<td>• Travel expense to APS • Plaque • 3yr APS membership</td>
</tr>
<tr>
<td>Cousins Chapter Award</td>
<td>Presented to one chapter that best achieves Psi Chi’s purpose</td>
<td>February 1</td>
<td>• Chapter</td>
<td>• One $3,500 award • Travel to APA • Plaque</td>
</tr>
<tr>
<td>Newman Graduate Research Award</td>
<td>Awards the student submitting best overall empirical study; cosponsored by APA</td>
<td>February 1</td>
<td>• Graduate</td>
<td>• Travel expense to APA • Plaque • 3yr journal subscription</td>
</tr>
<tr>
<td>Kay Wilson Leadership Award</td>
<td>Awards one chapter president who demonstrates excellence in the leadership of the local chapter</td>
<td>April 1</td>
<td>• Chapter President (chapter nomination)</td>
<td>• One $500 award • Travel to APA • Plaque</td>
</tr>
<tr>
<td>Guilford Undergraduate Research Awards</td>
<td>Awards for the best overall research papers submitted</td>
<td>May 1</td>
<td>• Undergraduate</td>
<td>• Grand prize—$1,250 • 1st place—$1,000 • 2nd place—$750 • 3rd place—$500 • Honorable Mention—$250</td>
</tr>
<tr>
<td>Building Bonds Awards</td>
<td>Awards to recognize collaborative activity by a Psi Chi and Psi Beta chapter</td>
<td>June 1</td>
<td>• Chapter</td>
<td>• $100 award • Plaque</td>
</tr>
<tr>
<td>Model Chapter Awards</td>
<td>All chapters meeting the five criteria will receive $100</td>
<td>June 30</td>
<td>• Chapters</td>
<td>• $100 each chapter</td>
</tr>
<tr>
<td>Diversity Article Awards</td>
<td>Awards for best <em>Eye on Psi Chi</em> articles published by student authors on diversity issues</td>
<td>July 1</td>
<td>• Graduate • Undergraduate</td>
<td>• Four $300 awards</td>
</tr>
<tr>
<td>Regional Research Awards</td>
<td>Up to 78 awards presented for the best research papers submitted as Psi Chi posters for the regional conventions</td>
<td>Deadlines Vary, Fall/Winter</td>
<td>• Graduate • Undergraduate</td>
<td>• $300 each (number varies)</td>
</tr>
<tr>
<td>Denmark Faculty Advisor Award</td>
<td>To one outstanding faculty advisor nominated by the chapter who best achieves Psi Chi’s purposes</td>
<td>December 1</td>
<td>• Faculty Advisor (chapter nomination)</td>
<td>• Travel expense to APA • Plaque</td>
</tr>
<tr>
<td>Kay Wilson Officer Team Leadership Award</td>
<td>Awards the best chapter officer team for exceptional leadership as a group</td>
<td>December 8</td>
<td>• Chapter</td>
<td>• $2,000 award ($1,000 for chapter + $1,000 for officers)</td>
</tr>
<tr>
<td>Regional Chapter Awards</td>
<td>Presented to one chapter in each of the six regions that best achieve Psi Chi’s purpose</td>
<td>December 1</td>
<td>• Chapter</td>
<td>• Six $500 awards • Plaque</td>
</tr>
<tr>
<td>Regional Faculty Advisor Awards</td>
<td>To six outstanding faculty advisors (one per region) who best achieve Psi Chi’s purpose</td>
<td>December 1</td>
<td>• Faculty Advisor (chapter nomination)</td>
<td>• Six $500 awards • Plaque</td>
</tr>
<tr>
<td>Society Annual Convention Research Awards</td>
<td>Up to 8 awards (4 grad, 4 undergrad) presented for the best research papers submitted for APA/APS conventions</td>
<td>December 1</td>
<td>• Graduate • Undergraduate</td>
<td>• $500 graduate (number varies) • $300 undergraduate (number varies)</td>
</tr>
</tbody>
</table>
# PSI Chi Research Grants

Psi Chi sponsors a variety of grants each year. Listed below is a brief overview. For more information, please visit [www.psichi.org/Awards/completelist_awards.aspx](http://www.psichi.org/Awards/completelist_awards.aspx)

<table>
<thead>
<tr>
<th>Name of Grant</th>
<th>Description of Grant</th>
<th>Submission Deadline</th>
<th>Who Can Apply?</th>
<th>Award Amount/Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate Assistantship Grants</td>
<td>Provides funding for teaching and research graduate assistantships during any academic semester</td>
<td>January 1</td>
<td>Graduate</td>
<td>Eight assistantships of $3,000</td>
</tr>
<tr>
<td>Collaboration Grants</td>
<td>Provides funds for a Psi Chi chapter and a Psi Beta chapter to collaborate on a shared activity</td>
<td>January 20 June 1</td>
<td>Chapter</td>
<td>Four $500 grants</td>
</tr>
<tr>
<td>FBI NCAVC Internship Grants</td>
<td>Provides living expenses for a 14-week unpaid FBI NCAVC internship to conduct research</td>
<td>February 1 June 1</td>
<td>Graduate, Undergraduate</td>
<td>Two grants, up to $7,000 each</td>
</tr>
<tr>
<td>APS Summer Research Grants</td>
<td>Provides opportunities to conduct research during the summer with sponsors who are APS members</td>
<td>March 1</td>
<td>Undergraduate</td>
<td>Six $5,000 grants ($3,500 student + $1,500 sponsor)</td>
</tr>
<tr>
<td>CUR Summer Research Grants</td>
<td>Provides opportunities to conduct research during the summer with sponsors who are CUR members</td>
<td>March 1</td>
<td>Undergraduate</td>
<td>Two $5,000 grants ($3,500 student + $1,500 sponsor)</td>
</tr>
<tr>
<td>SRLCD Summer Research Grants</td>
<td>Provides opportunities to conduct research during the summer with sponsors who are SRLCD members</td>
<td>March 1</td>
<td>Undergraduate</td>
<td>Two $5,000 grants ($3,500 student + $1,500 sponsor)</td>
</tr>
<tr>
<td>Summer Research Grants</td>
<td>Provides opportunities to conduct research during the summer at nationally recognized research institutions</td>
<td>March 1</td>
<td>Undergraduate</td>
<td>Fourteen $5,000 grants ($3,500 student + $1,500 sponsor)</td>
</tr>
<tr>
<td>Faculty Advisor Research Grants</td>
<td>Provides funding for the direct costs of a project to support faculty advisors’ empirical research</td>
<td>June 1</td>
<td>Faculty Advisor</td>
<td>Twelve grants, up to $2,000 each</td>
</tr>
<tr>
<td>STP Assessment Resource Grants</td>
<td>Supports projects to develop assessment tests, instruments, and processes for the APA Guidelines for the Undergraduate Psychology Major</td>
<td>June 1</td>
<td>Psi Chi Faculty Members</td>
<td>Three $2,000 grants</td>
</tr>
<tr>
<td>APAGS/Psi Chi Junior Scientist Fellowships</td>
<td>Provides funding for a 1st-year or 2nd-year graduate-level project</td>
<td>June 30</td>
<td>Psi Chi Members, APAGS Members</td>
<td>$1,000 fellowships, (number varies)</td>
</tr>
<tr>
<td>Unrestricted Travel Grants</td>
<td>Funding to assist students with travel expenses to a convention not funded by Psi Chi Regional Travel Grants. Total grant money available is $22,500</td>
<td>September 5 December 5 May 5</td>
<td>Graduate, Undergraduate</td>
<td>Up to $1,500 each</td>
</tr>
<tr>
<td>SuperLab Research Grants</td>
<td>Two awards for conducting the best computer-based research</td>
<td>October 1</td>
<td>Graduate, Undergraduate</td>
<td>SuperLab software, Response pad</td>
</tr>
<tr>
<td>Thelma Hunt Research Grants</td>
<td>Enables members to complete empirical research on a question directly related to Psi Chi</td>
<td>October 1</td>
<td>Faculty, Graduate, Undergraduate</td>
<td>Two grants up to $3,000 each</td>
</tr>
<tr>
<td>Undergraduate Psychology Research Conference Grants</td>
<td>To support local/regional undergraduate psychology conferences. Total grant money available is $15,000</td>
<td>October 1</td>
<td>Sponsor(s) of local and regional conference</td>
<td>Up to $1,000 each (number varies)</td>
</tr>
<tr>
<td>Regional Travel Grants</td>
<td>$33,000 overall available to assist students with travel expenses to a regional convention</td>
<td>Deadlines Vary, Winter/Spring</td>
<td>Graduate, Undergraduate</td>
<td>Up to $400 each (number varies)</td>
</tr>
<tr>
<td>Graduate Research Grants</td>
<td>To provide funds for graduate students to conduct a research project. Total grant money available is $20,000</td>
<td>November 1 February 1</td>
<td>Graduate, Undergraduate</td>
<td>Up to $1,500 each (number varies)</td>
</tr>
<tr>
<td>Mamie Phipps Clark Research Grants</td>
<td>Enables members to conduct a research project focusing on ethnic minorities. Total grant money available is $10,000</td>
<td>November 1 February 1</td>
<td>Faculty, Graduate, Undergraduate</td>
<td>Up to $1,500 each (number varies)</td>
</tr>
<tr>
<td>Undergraduate Research Grants</td>
<td>Funding to defray the cost of conducting a research project. Total grant money available is $30,000</td>
<td>November 1 February 1</td>
<td>Undergraduate</td>
<td>Up to $1,500 each (number varies)</td>
</tr>
</tbody>
</table>
Online Journal Submission Process

All Psi Chi undergraduates, graduates, and faculty* are invited to submit their research to the Psi Chi Journal of Psychological Research through the new web based manuscript submission, tracking, and peer review software solution. Better than email submissions used in the past, this software allows users to create personal accounts to make the submission process more efficient.

Four items are required for all submissions:

1) **Cover Letter**
   Include primary author's education status, manuscript originality statement, IRB approval

2) **Sponsoring Statement**
   Undergraduate first authors only

3) **Cover Page**
   Author names, school affiliation, and any author note

4) **Masked Manuscript**
   MS Word with all personal information removed

Simply register an account, then click Submit Manuscript:

1) **Upload Files**
   Files can be removed, replaced, or reorganized

2) **Enter Manuscript Information**
   E.g., title, abstract, authors, keywords, etc.

3) **Review Manuscript Material**
   Summary of all information/files submitted

4) **Submit Manuscript**
   Receive email confirmation

New software benefits:

- Allows users to track their manuscripts' progress
- Inserts multiple files including cover letters, manuscripts, and figures
- Permits users to prioritize files and coauthors
- Checks for mistakes in the submission process and points out any errors
- Streamlines the process for authors and reviewers

* Psi Chi member ID number required

Register an account: http://pcj.msubmit.net/cgi-bin/main.plex
Tutorial videos: http://www.ejpress.com/demos