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ASIAN AMERICAN FEMALE HIGH SCHOOL AND COLLEGE STUDENTS IN STEM AND NON-STEM: IMPOSTER SYNDROME RELATED TO SELF, PEERS AND FAMILY VALUES



ZHENG, KEXIN

DEPARTMENT OF PSYCHOLOGY
FORDHAM UNIVERSITY
NEW YORK



FANG, MEGAN

QUEENS HIGH SCHOOL FOR THE SCIENCES AT YORK COLLEGE
JAMAICA, NEW YORK

Ms. Kexin Zheng
Department of Psychology
Fordham University
New York, NY

Ms. Megan Fang
Queens High School for the Sciences at York College
Jamaica, NY

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Synopsis:

Imposter syndrome is a phenomenon that affects how individuals depict themselves, often delineated through feelings of inadequacy and incompetence despite external evidence of success and achievement. Imposter symptoms linger as students advance in their academic trajectory through high school and college in STEM and non-STEM realms. Each setting embodies its own unique environment and psychosocial stressors that may induce more pressure and tension than the other. The purpose of this study was to conduct a comparative analysis of the differences between perceptions of three domains of the imposter phenomenon (i.e., self, peers, and family values) among a sample of 102 Asian American female high school and college students in STEM and non-STEM disciplines.

Abstract

Clance and Imes first observed the imposter phenomenon in 1978 to describe an intense sense of intellectual fraudulence among a sample of high-achieving women. Emerging research has well-documented the prevalence of imposter syndrome in secondary and higher education. This study is a preliminary report exploring the prevalence of imposter syndrome across three domains (i.e., self, peers, and family values) among a sample of 102 Asian American high school and college students in STEM and non-STEM, with ages ranging from 15 to 22 years. Research respondents were recruited online to complete a self-report questionnaire related to internalized barriers to recognizing success and achievement associated with self, peers, and family values. This study found that only education level significantly affected the expression of imposter syndrome related to the self, with college students scoring higher on average than high school students. Implications and directions for future research can examine the complexity of this phenomenon and its cultural and psychological correlates and causal effects across diverse racial, ethnic, and gender populations. The manifold facets of imposter syndrome that contribute to its manifestation, perpetuation, and mental health disparities in Asian Americans can provide a more comprehensive understanding of culturally informed interventions and practices to unmask imposter syndrome.

Keywords: Asian Americans, female, high school, college, imposter syndrome, imposter phenomenon, STEM, non-STEM

**Asian American Female High School and College Students in STEM and Non-STEM:
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Clance and Imes (1978) first coined the term “imposter phenomenon” to inform “an internal experience of intellectual phoniness” (p. 241). It primarily concerned psychological exposure to lingering perceptions of oneself as an intellectual fraud (Clance, 1985). Likewise termed the “imposter syndrome,” this phenomenon rendered it difficult to ascribe success to intrinsic intellect and raw talent. Despite external evidence of achievement, feelings of inadequacy and overall incompetence insidiously persisted (Cokley et al., 2013; Wyatt et al., 2019).

The accumulation of “laboratory, observational, and historical evidence revealed pervasive cultural associations linking men but not women with raw intellectual talent” (Leslie et al., 2015, p. 262). Firmly grounded sex roles and masculine traits entailed confidence and competence. In contrast, women were simultaneously bound to domestic realms, incapable of achieving the parallel success of their male counterparts (Kang et al., 2018). Clance and Imes’ (1978) pioneering study found that most “imposters” in a sample of primarily high-achieving White middle- to upper-class women of ages 20 to 45 were positioned in one of two family dynamics. The first involved women with “intellectual” siblings. Such women were explicitly or implicitly informed of their helplessness to succeed on a par with their siblings. The second included women compelled to believe and endorse their “superior” capacity. The confluence of self-doubt, internalized stress, and pressure to fulfill individual and family expectations were aggravated in light of indiscriminate praises and approvals. Clance and Imes (1978) also proposed four modes of behavior that contributed to the maintenance of imposter syndrome among women: 1) diligence and hard work, 2) intellectual flattery, 3) charm and perceptiveness,

and 4) perpetuation of an intellectual phony image to eschew social rejection. The ubiquity of imposter syndrome in women has also led to the underrepresentation of gifted females and the rise of male dominance in mathematics and science, dilating the STEM gap between genders (Reis, 2004).

In the United States, Asian Americans are cast as a “model minority,” rendering this population more vulnerable to feelings of imposterism. The most striking stereotype was an academic-oriented achievement, typically attributed to Asian Americans’ worth ethic, intellect, and perceived inherent universal success. Such positive stereotypes instigated pressure to perform and succeed and fear of failure in secondary and higher education. Bennion et al. (2018) found an increasing need to implement stress management interventions in light of intensified stress levels in collegiate environments. Exacerbated psychological distress and anxiety functioned as serious consequences of conforming to these standards and triggered imposter symptoms (Kwan, 2015; Le, 2019). Imposter syndrome also stemmed from insecurity and self-doubt amid the majority population despite Asian Americans’ “model minority” image. For women and ethnic and racial minorities, pervasive gender and racial stereotypes have evoked greater susceptibility to imposter feelings (Parkman, 2016).

The buildup of internal and external academic and psychosocial stressors, coupled with students’ transition to adulthood, proliferated the pressure to achieve academic excellence, increasing vulnerability to stress-related mental health outcomes (Conley et al., 2013; Reddy et al., 2018). In a relevant study, Cokley et al. (2013) found that imposter symptoms were particularly salient among Asian Americans in a sample of 240 self-identified ethnic minority college students between the ages of 17 and 30. Compared to African and Latinx Americans, who reported no significant ethnic differences in imposter feelings and psychological distress

and well-being, Asian Americans reported the highest scores in imposter feelings and psychological distress and the lowest in well-being. Cokley et al. (2013) posited that such high scores might be ascribed to the burden of contending with parental and societal expectations and other minority status-related stressors and experiences.

STEM, an acronym for science, technology, engineering, and mathematics, has become the acme of intelligence, compelling students pursuing this field to uphold stereotypes and expectations for brilliance from self, peers, and family values. According to Castro and Collins (2020), Asian American women in STEM have been posited in a paradoxical realm: underrepresented as women but overrepresented as Asian Americans. In general, STEM students have typically faced a copious amount of stress in light of the competitiveness in their respective traditionally male-dominated fields. The strain of maintaining an intellectual image and concurrently striving to achieve optimal performance left students overwhelmed with feelings of inadequacy and self-doubt. Similarly, in the collegiate setting, students also reported frequent instances of imposter syndrome, but to a greater degree, given the more rigorous academic atmosphere, external stressors, and struggle to maintain a high grade point average (GPA) (Parkman, 2016). All of these factors contributed to common cases of the imposter phenomenon.

Imposter syndrome has been well-researched as a prevalent phenomenon among Asian American female students. The purpose of the present study was to compare the extent to which self-reported levels of imposter symptoms related to self, peers, and family values differed across four groups: 1) Asian American female high school students in STEM, 2) Asian American female college students in STEM, 3) Asian American female high school students in non-STEM, and 4) Asian American female college students in non-STEM.

Method

Participants

The online sample consisted of 102 Asian American female high school and college student participants. Of the 102 participants, 53 (52%) were high school students and 49 (48%) were college students, with ages ranging from 15 to 22 years ($M = 17.9$, $SD = 2.4$). There were 57 (56%) high school and college students pursuing STEM and 45 (44%) pursuing non-STEM.

Measures

Sociodemographic Characteristics. Participants reported their age, gender, race, ethnicity, education level, institution name, and field of study (i.e., STEM or non-STEM).

Mental Health Survey. The Mental Health Survey is a 15-item questionnaire used to assess students' perceptions of imposter symptoms across the domains of self, peers, and family values. Each item was rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with greater scores yielding greater imposter syndrome-related symptoms. Three factors with eigenvalues greater than one were extracted, and construct validity was supported for this instrument, with the percent of explained variance calculated to be 72%. This measure has also indicated excellent internal consistency ($\alpha = .93$).

Results

A two-way ANOVA was performed to analyze the effect of education level (i.e., high school and college) and field of study (i.e., STEM and non-STEM) on students' perceptions of imposter syndrome related to self, peers, and family values.

Students' Perceptions of Imposter Syndrome Related to the Self

As shown in Table 1, the two-way ANOVA revealed that there was no significant interaction between education level and field of study on imposter syndrome related to the self

($F(1,99) = .47, p > .05, \eta^2 = .01$). Simple main effects analysis showed that education level did have a statistically significant effect on imposter syndrome related to the self ($F(1,99) = 5.69, p < .05, \eta^2 = .13$) as college students ($M = 20.29, SD = 2.73$) reported a greater level of imposter syndrome among themselves than high school students ($M = 18.67, SD = 2.35$). Simple main effects also showed that the field of study did not have a statistically significant effect on imposter syndrome related to the self ($F(1,99) = 1.27, p > .05, \eta^2 = .03$). There was no significant difference between STEM ($M = 19.44, SD = 2.53$) and non-STEM students ($M = 19.14, SD = 2.85$) on perceptions of imposter syndrome related to the self.

Table 1

Means, Standard Deviations, and Two-Way ANOVA Statistics for Students' Perceptions of Imposter Syndrome Related to the Self

| Source | Level | <i>M</i> | <i>SD</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | η^2 |
|--------------------|-------------|----------|-----------|-----------|-----------|-----------|----------|----------|
| Level of Education | High School | 18.67 | 2.35 | 36.28 | 1 | 36.28 | 5.69* | .13 |
| | College | 20.29 | 2.73 | | | | | |
| Field of Study | STEM | 19.44 | 2.53 | 8.09 | 1 | 8.09 | 1.27 | .03 |
| | Non-STEM | 19.14 | 2.85 | | | | | |
| Interaction | | | | 3.00 | 1 | 3.00 | .47 | .01 |
| Error | | | | 236.09 | 99 | 6.38 | | |
| Total | | | | 15611.00 | 102 | | | |

* $p < .05$.

Students' Perceptions of Imposter Syndrome Related to Peers

As shown in Table 2, a two-way ANOVA revealed that there was no significant interaction between education level and field of study on imposter syndrome related to peers ($F(1, 99) = .26, p > .05, \eta^2 = .01$). Simple main effects analysis showed that education level ($F(1,99) = .02, p > .05, \eta^2 = .00$) and field of study ($F(1,99) = .25, p > .05, \eta^2 = .01$) did not have a statistically significant effect on imposter syndrome related to peers. There was no significant difference between high school ($M=17.79, SD = 3.30$) and college students ($M = 17.59, SD = 3.74$) and STEM ($M = 17.93, SD = 3.86$) and non-STEM students ($M = 17.29, SD = 2.53$) on perceptions of imposter syndrome related to peers.

Table 2

Means, Standard Deviations, and Two-Way ANOVA Statistics for Students' Perceptions of Imposter Syndrome Related to Peers

| Source | Level | <i>M</i> | <i>SD</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | η^2 |
|--------------------|-------------|----------|-----------|-----------|-----------|-----------|----------|----------|
| Level of Education | High School | 17.79 | 3.30 | .24 | 1 | .24 | .02 | .00 |
| | College | 17.59 | 3.74 | | | | | |
| Field of Study | STEM | 17.93 | 3.86 | 3.14 | 1 | 3.14 | .25 | .01 |
| | Non-STEM | 17.29 | 2.53 | | | | | |
| Interaction | | | | 3.25 | 1 | 3.25 | .26 | .01 |
| Error | | | | 467.46 | 99 | 12.6 | | |
| Total | | | | 13330.00 | 102 | | | |

Students' Perceptions of Imposter Syndrome Related to Family Values

As shown in Table 3, a two-way ANOVA revealed that there was no significant interaction between education level and field of study on imposter syndrome related to family values ($F(1, 99) = .14, p > .05, \eta^2 = .00$). Simple main effect analysis showed that education level ($F(1,99) = .04, p > .05, \eta^2 = .00$) and field of study ($F(1,99) = .48, p > .05, \eta^2 = .01$) did not have a statistically significant effect on imposter syndrome related to family values. There was no significant difference between high school ($M=18.83, SD = 4.09$) and college students ($M = 18.29, SD = 5.57$) and STEM ($M = 19.04, SD = 4.69$) and non-STEM students ($M = 17.79, SD = 4.79$) on perceptions of imposter syndrome related to family values.

Table 3

Means, Standard Deviations, and Two-Way ANOVA Statistics for Students' Perceptions of Imposter Syndrome Related to Family Values

| Source | Level | <i>M</i> | <i>SD</i> | <i>SS</i> | <i>df</i> | <i>MS</i> | <i>F</i> | η^2 |
|--------------------|-------------|----------|-----------|-----------|-----------|-----------|----------|----------|
| Level of Education | High School | 18.83 | 4.09 | .87 | 1 | .87 | .04 | .00 |
| | College | 18.29 | 5.57 | | | | | |
| Field of Study | STEM | 19.04 | 4.69 | 11.33 | 1 | 11.33 | .48 | .01 |
| | Non-STEM | 17.79 | 4.79 | | | | | |
| Interaction | | | | 3.24 | 1 | 3.24 | .14 | .00 |
| Error | | | | 865.87 | 99 | 23.40 | | |
| Total | | | | 15083.00 | 102 | | | |

Discussion

Students' Perceptions of Imposter Syndrome Related to the Self

The results of the present study are consistent with past research on the effect of imposter syndrome among the female population. This study aims to expand on the preliminary research on the role and effect of imposter syndrome on Asian American female students in both STEM and non-STEM, extending it to examine its prevalence in adolescent and adult racial and ethnic minorities. It further explores the domains of self, peers, and family values as sources of imposterism. The findings indicate that Asian American female college students reported a greater level of imposter syndrome related to the self than their high school counterparts, which can be attributed to differences in academic settings. Intensified physical and mental demands and developmental challenges cannot be divorced from the college experience. The nature of a college's selectivity, competitiveness, and low acceptance rates can be correlated with high levels of imposter syndrome and self-doubt as one comes to question their sense of belonging and competency among a pool of high-achieving and ambitious candidates. Another explanation for higher scores among college students can be the rigor of college classes, and the difficulty of maintaining a competitive GPA to receive job and graduate program offers amid balancing part-time jobs and other commitments and responsibilities.

While there are differences in academic environments, high school and college students in both STEM and non-STEM disciplines appear to have reported similar levels of imposter syndrome. One explanation is that despite pursuing a non-STEM field such as vocational jobs (e.g., nurses, dentists, orthodontists, and other healthcare-related positions), most of these students' curriculums consist of STEM classes with other STEM (e.g., engineers, computer scientists) and male peers. In addition, because high school students are required to take courses

in STEM and non-STEM subjects, such as art, math, science, and humanities, there is little distinction between students who intend to pursue STEM and non-STEM.

Students' Perceptions of Imposter Syndrome Related to Peers

The findings indicate that high school and college students in STEM and non-STEM have reported similar scores of imposter syndrome concerning peers. Considering all participants are Asian Americans, it is likely that similar stereotyped expectations have been encountered across or normalized by all participants; hence little difference can be drawn across both education levels and fields of study. It is also possible that the lingering impact of “model minority” expectations is pervasive and gauged as a shared experience among this population, leaving students to report imposter syndrome comparably across all four groups.

Students' Perceptions of Imposter Syndrome Related to Family Values

The results demonstrate that high school and college students in STEM and non-STEM fields perceive imposter syndrome similarly regarding family values. Family values are likely fostered and instilled at a young age, resulting in the internalization of and adherence to traditional family cultures and expectations. Asian families typically emphasize education and consider academic success and excellence synonymous with family honor. Therefore, family values and expectations of education persist regardless of education level and field of study.

Limitations

Despite the strengths of this study in addressing imposter symptoms among an underrepresented minority in research, its limitations should also be considered and interpreted. The first major limitation is the primary method of sampling: convenience and snowball sampling. Such means of data collection render generalizability relatively low. There are also limited geographical differences as most students resided or attended school on the East Coast,

specifically in New York. The relatively small sample can be expanded to include students spread across the United States. A second limitation is individual differences in the interpretation of measure items and how academic disciplines are understood, such as how to discriminate between STEM and non-STEM majors or careers.

Implications and Directions for Future Research

As illustrated in this study, there is a statistically significant effect on education level and students' perceptions of imposter syndrome related to the self. It can be concluded that the most direct factor or cause of imposter syndrome is rooted in feelings of self-doubt and self-inadequacy. Consequently, self-image and confidence are sabotaged. Evidence of the imposter phenomenon in academic environments can kindle a ripple effect of self-distrust and high levels of insecurity across multiple psychosocial settings and professional environments. The temporary need to succeed in high school can instigate long-term detrimental impacts on students' mental health, success and performance in college and graduate programs, and career prospects.

In light of the emerging phenomenon of imposter syndrome in secondary and higher education, educators need to address and recognize its ubiquity and trend to implement effective interventions to mitigate the destructive effects attached to this feeling of fraudulence across their student, faculty, and staff populations. Efforts to minimize imposterism can help retain top scholars and intellectuals in their respective fields and reduce rates of low self-value, overall self-worth, and intense feelings of incompetence compared to their peers (Parkman, 2016). Chronic imposter syndrome can catalyze anxiety and depressive symptoms, often comorbid with severe mental health outcomes (e.g., clinical anxiety and depression and self-injury). Imposter syndrome can also intimidate and discourage qualified candidates from considering leadership

roles, applying to work positions or opportunities, and accepting offers from prestigious and top-tier institutions and corporations. Job satisfaction and performance can be impaired, reducing employee retention and career motivation. The increased fear of failure is paired with decreased self-esteem and confidence.

The lack of attention devoted to imposter syndrome in education tends to condone societal sex role stereotypes that prompt females to feel more despondent about pursuing traditionally male-dominated fields such as STEM and inclined to accept a domestic role. Directions for future research can explore the fundamental causal roots of imposter syndrome across ethnic (i.e., subgroups under the umbrella term of Asian Americans) and gender populations (e.g., gender minorities and members of the LGBTQ+ community) and compare and contrast lingering effects across these groups. This research explores at least three sources of imposter syndrome (i.e., self, peers, and family values); subsequent analyses can move beyond this set of individual and social domains to examine cultural and psychological correlates and mediators and moderators of this relationship and re-examine potential dimensions through another lens considering relevant antecedents and consequences. Future studies can investigate other facets and characteristics that affect imposter syndrome's threshold and overall development and analyze disparities across groups to better understand risk and protective factors and identify effective and culturally informed educational practices to overcome this syndrome.

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