Abstract

Acculturation, Acculturative Stress, and Outcomes in an Asthma-PD Latine Sample

Introduction. Latines have some of the highest prevalence rates of asthma. Panic Disorder has been found to co-occur at high rates with asthma for this population. The process of acculturation to a dominant culture has been shown to have contradictory effects on the health of Latines. Acculturative stress may explain some of the negative mental and physical health findings related to acculturation. This study aimed to investigate the associations between acculturation and panic severity, cardiorespiratory panic symptoms, fear of dying during a panic attack, and confusion between asthma and panic symptoms. Additionally, the study explored associations between acculturative stress and panic severity, symptom confusion, and objective pulmonary function. **Methods.** 53 Latine adults diagnosed with asthma and panic disorder participated in this cross-sectional study. Participants were recruited via mailings from providers, outpatient clinics, and emergency rooms in the Bronx, NY. Acculturation was captured through three proxies: self-reported nativity, English language proficiency (Language Preference and Proficiency Questionnaire), and identity acculturation (Ethnic Identification Scale). The Cultural Stress Questionnaire measured acculturative stress. Panic severity was assessed via the Panic Disorder Severity Scale. After conducting a semi-structured clinical interview, trained raters assessed whether participants experienced cardiorespiratory symptoms and fear of dying during panic attacks, and level of confusion between asthma and panic symptoms. FEV_1 percent predicted and FEV_1/FVC

scores indicated pulmonary function and were collected via spirometry. **Results.** Greater identification with mainstream U.S. culture, but not nativity or language proficiency, was associated with greater panic severity (R^2_{change}=.130, p=.007) and fear of dying (OR=3.63, 95% CI [1.02, 12.97], p=.047). Greater acculturative stress was associated with less symptom confusion (OR=.049, 95% CI [.003, .856], p=.039) and worse pulmonary function (R^2_{change}=.095, p=.023). **Conclusion.** As hypothesized, greater identification with U.S. mainstream culture was significantly associated with greater panic severity and experiencing fear of dying during a panic attack. Greater acculturative stress was significantly associated with worse pulmonary function and less symptom confusion. Providers who assess and treat Latines with comorbid asthma and panic disorder may target panic severity and pulmonary function by giving greater attention to levels of identity acculturation and acculturative stress.

Acculturation, Acculturative Stress, and Outcomes in an Asthma-PD Latine Sample

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Chapter I: Introduction

Background and Significance

Asthma is a common chronic illness characterized by inflammation of the airways, periods of airflow obstruction commonly referred to as asthma attacks, and possible remodeling of the airways (Abramson et al., 2014) that affects over 19 million adults in the United States (Centers for Disease Control and Prevention, 2018). Triggering factors, such exercise, respiratory infections, allergens, airborne irritants, and psychological stressors can contribute to inflammation and hyperreactivity of the airways in the lungs (Garg et al., 2003). Airway inflammation characteristic of asthma can cause recurrent episodes of wheezing, breathlessness, chest tightness, and coughing (NHLBI, 2007). Although asthma can be controlled with a regimen of inhaled corticosteroid and bronchodilator medications (NHLBI, 2007), more than 60% of adults diagnosed with asthma had uncontrolled asthma in 2016 (Centers for Disease Control and Prevention, 2016). If left untreated, asthma attacks can be life-threatening and result in hospitalization and death. During 2008–2013, asthma was responsible for $3 billion in losses due to missed work and school days; the total cost of asthma in the United States was estimated to be $81.9 billion in 2013 (Nurmagambetov et al., 2018). Asthma places a significant health and financial burden for society at large.

Asthma Disparities

Clear disparities in asthma prevalence exist between geographic regions, ethnic groups, gender, and SES. In New York, 55.5% of adults with current asthma had

uncontrolled asthma in 2016, with the highest concentration being in the Bronx and Brooklyn (Centers for Disease Control and Prevention, 2018). Latines and Non-Hispanic (NH) Blacks are disproportionately affected by asthma with some of the highest rates of asthma and asthma attack prevalence (Centers for Disease Control and Prevention, 2016). Puerto Ricans have the highest prevalence of asthma (12.1%) across all ethnic groups (Centers for Disease Control and Prevention, 2018). Individuals below 100% of the federal poverty level carry the largest disease burden with prevalence rates of 11.7 %, poorest self-rated health, and the highest asthma health care costs per person of any SES group (Centers for Disease Control and Prevention, 2018; Moorman et al., 2012; Pate et al., 2019). The average income for Latine families and NH-black families is 93% and 77% lower than the average income for NH-white families (Fiscal Policy Institute, 2017). In adults, women have higher rates of asthma and are at much higher risk of dying from asthma than men (Centers for Disease Control and Prevention, 2018). The number of disparities highlight the need for research specifically targeting geographic region and ethnicity.

Asthma and Panic Disorder

Panic disorder (PD) has been shown to be the most prevalent anxiety disorder in individuals with asthma (Boudreau et al., 2015; Feldman et al., 2010; Kessler et al., 2005). Rates of PD range from 6.5% to 13.2%, up to 6 times higher than rates in the general population. (Carr, 1998; Nascimento et al., 2002; Shavitt et al., 1992). PD is characterized by recurrent experiences of unexpected panic attacks with patterns of intense worry and accompanying physiological symptoms (American Psychological Association, 2013). Physical symptoms, such as such as dyspnea, chest tightness, and smothering sensations can occur in both PD and asthma (Boudreau et al., 2017). PD has been associated with worse

asthma outcomes, such as worse asthma control, increased rescue medication use, and emergency visits (Favreau et al., 2014; Feldman et al., 2010; Schneider et al., 2008).

Ethnic populations might be at higher risk of negative outcomes due to asthma-PD comorbidity. In the Bronx, rates of PD are greatly elevated among Puerto Ricans with asthma (21%) and Spanish-speaking patients haver higher rates than English-Speaking counterparts (Feldman et al., 2010). Latines with PD are more likely to report greater impact of asthma triggers, suggesting that Latine individuals with asthma and PD subjectively interpret asthma as stress-induced more readily (Vazquez et al., 2017). Factors related to the acculturation process might negatively affect asthma-PD outcomes in the Latine population.

Acculturation

Ethnonyms

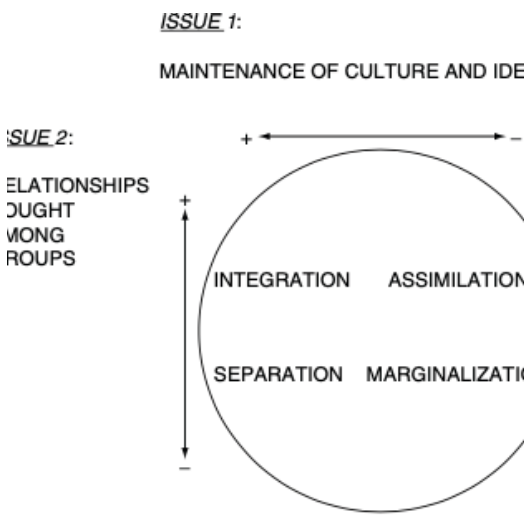
According to the 2020 U.S. census, "Hispanic/Latino" is the second largest growing population (Bureau., 2021). The ethnonyms "Hispanic" and "Latino" are often used interchangeably to describe populations that overlap but are defined by different characteristics. The term "Hispanic" was adopted by the U.S. census in 1978 to demark those whose "culture of origin is Spanish, regardless of race" and refers to any person originating from a Spanish-speaking nation (Alcoff, 2005). "Latino" resulted from a shortening of the term *latinoamericano*, adopted by former Spanish colonies after independence in the 1850s (Blakemore, 2022). Mexican, Puerto Rican, and Cuban activists adopted and popularized the term in the 1960s in an effort to advocate for and promote the civil rights of people from Latin America (Central American, South America, and the Caribbean) (Blakemore, 2022). Both terms have been received criticism, which has led to the creation of new terms.

"Hispanic" has been criticized and rejected by many for its ties to Spanish colonization, erasure of race, and its similarity to a racial slur (Blakemore, 2022; García, 2020). Although "Latino" is more inclusive of nationality, language, and race, the term uses the binary gender grammatical structures of the Spanish language (Borrell & Echeverria, 2022). The beginning of the 21st century saw the rise of "Latinx" in the U.S., a gender nonbinary term used largely by college educated and English-speaking groups (García, 2020). The ethnonym "Latinx" has come under criticism because the addition of the X anglicizes "Latino," rendering it difficult to pronounce in Spanish (García, 2020). Additionally, the term "Latinx" ignores the gender neural ending, *-e*, that already exists in Spanish. "Latine" is a Spanish adherent gender neutral alternative to "Latinx" that is easier for Spanish-speakers to use (Morales, 2022).

Theoretical Framework

Acculturation is a multidimensional construct that describes the adaptation to cultural elements of the dominant society— language, food choice, dress, music, values, etc. (Lara et al., 2005). Broadly, acculturation can be defined as a continuous process at the individual or group level, by which adaption to a new environment, norms, values, and/or practices of a dominant society takes place (Abraido-Lanza et al., 2016). In the 1960s, assimilation (the result of the immigrant ethnic group accommodating and developing values in line with those of the dominant culture) and acculturation were believed to be unidirectional and inevitable. (Lara et al., 2005). Later research has rejected the view of the acculturation process as static and linear, and instead, adopted a view of acculturation as a bidirectional exchange between immigrants and members of the dominant society (Abraido-Lanza et al., 2016).

Different models of the multidimensional process of acculturation have been proposed. Since the 1980's, acculturation has been defined as multi-dimensional, resulting in four acculturation strategies (Bekteshi & Kang, 2018). Perhaps the most cited, Berry's model explains the process through four strategies (Figure 1) and five levels of acculturation that occur at the individual level (Berry, 2006; Berry et al., 1987). The four acculturation strategies proposed by Berry include separation (maintaining only origin culture), integration of origin and dominant cultures, assimilation (forfeiting origin culture and adoption of dominant culture), and marginalization (rejection of origin and dominant cultures) (Berry, 2006). The five levels of acculturation vary depending on acculturation strategy, with integration and assimilation experiencing all levels to varying extents. Initially, physical changes may occur through immigration, such as relocation, new housing, and changes to population density (Berry et al., 1987). Secondly, immigrants experience biological changes due to dietary changes and new diseases (Berry et al., 1987). Thirdly, cultural changes occur through exposure to new political and economic systems, linguistic demands, religions, and social institutions (Berry et al., 1987). Fourth, immigrants develop new social relationships, that may include ingroup-outgroup interactions and dominance patterns (Berry et al., 1987). Lastly, changes at the individual level in psychological functioning, behavioral changes, and mental health status may occur in response to adaptation to the dominant culture (Berry et al., 1987). Other models of the acculturation process highlight "culture learning" through categories that collapse those proposed by Berry.



Marin proposed that the "culture learning" of acculturation occurs in three consecutive levels. This model postulates the initial stage happens superficially though the acquisition of new facts about the dominant culture and changes to diet and use of media (Marín, 1992). At the intermediate level, changes relating to social behaviors occur (i.e. language preference, language use, and preference for the ethnicity of friends, neighbors, spouse, and media). Lastly, Marin (1992) postulated that the final level is the most significant and permanent cultural learning. In the final level of the acculturation process, adoption of new values and norms and maintenance of the original cultural values and norms occur nonlinearly (Marín, 1992).

A number of contextual factors described as part of the process of acculturation in both Berry and Marin's models (language fluency, immigration status, and time and number of generations living in the U.S.) have been used as proxies for acculturation throughout the

research literature (Lara et al., 2005). Scales of acculturation differ in what subconstructs are measured (culturally specific behavior, language preference and proficiency, culture-specific knowledge, cultural identity, and adoption of dominant values), but by and large include a language component (Lara et al., 2005). Possibly, partially as a result of the wide variation of measures of acculturation used, acculturation has been found to have negative, positive, and no effects on Latine health outcomes (Abraido-Lanza et al., 2016; Rudmin, 2009).

Acculturation and Health

The effect of acculturation on Latine health behaviors and outcomes suggests conflicting results that require further investigation to clarify. Although not absolute, the body of evidence indicates that greater acculturation is associated with negative health behaviors, but positive healthcare use and self-perceptions of health; a relationship that may vary by Latine ethnocultural groups (Abraido-Lanza et al., 2016; Lara et al., 2005). The Hispanic Health Paradox illustrates the phenomenon of better health and lower mortality of Latines relative to Non-Latine Whites (NLW) despite facing greater risks and lower status within the dominant culture (Luthra et al., 2020; Ruiz et al., 2018). The literature has documented that this health benefit appears to erode with time in the U.S. The prevailing hypothesis of increased health risk among immigrant populations reasons that increased time in the dominant culture results in acculturation to dominant health behaviors and erosion of protective factors relating to the origin culture (Finch et al., 2004; Scribner, 1996).

Higher levels of acculturation may carry with it more sources of stress. Exposure to stress resulting from the process of acculturation is believed to intersect with systemic aspects involved in adapting to a dominant culture (Finch & Vega, 2003). Increased health risks among immigrants have been linked to poverty, limited opportunities, and

discrimination (Finch et al., 2004; Finch et al., 2000). It has been theorized that the process of acculturation may lead to an erosion of the immigrant health advantage through the loss of protective cultural factors, such as social support, cultural traditions, dietary practices, and cultural identity (Finch et al., 2004). However, much of acculturation research has been conducted with Mexican populations and generalized widely to other Latine populations (Bekteshi & Kang, 2018; Lara et al., 2005).

Latine populations may share some cultural values and a common language, but substantial heterogeneity has been observed across groups in regard to immigration patterns, national history, cultural norms, etc. (Abraido-Lanza et al., 2016). Heterogeneity among Latine groups may translate to differences in health outcomes. For example, Puerto Ricans have the highest rates of asthma, whereas Mexicans have the lowest (Centers for Disease Control and Prevention, 2018). Differences among Latine subgroups also extend to mental health. In a study comparing acculturation factors related to mental health in Mexicans, Puerto Ricans, and "other" Latines, researchers found differences among the three groups. Mexicans and "other" Latines that were U.S. born were more likely to have any psychiatric disorder than foreign-born Latines, but no significant differences were found for Puerto Ricans (Ortega et al., 2000). In terms of language use, Mexicans who spoke English at home as children, and "other" Latines who currently spoke English at home, were more likely to have $\geq$ 3 disorders; Puerto Ricans who currently spoke English at home were more likely to have a substance use disorders (Ortega et al., 2000). A possible reason for the range of health outcomes among Latine groups and inconsistency in acculturation research findings is the experience of stress involved in the process of acculturation for different Latine groups.

Acculturation and Acculturative Stress

Acculturative stress can be described as the stress reactions to intercultural contact or the cultural adaptation process of acculturation (Berry, 2006; Berry et al., 1987; Driscoll & Torres, 2013; Torres et al., 2012). At the individual level, acculturative stressors can present as lowered mental health status, increased somatic symptoms, feelings of alienation, and identify confusion (Berry et al., 1987) when integrating new belief systems and social roles (Caplan, 2007). As such, acculturative stress can result in a reduction of physical, psychological and social health (Berry et al., 1987). An association between net of acculturative stress and lower self-ratings of health in Latines has been observed in the literature (Finch et al., 2004). External (historical, economic, development, and cultural) and internal (structural, psychological, and philosophical) contexts can influence the experience of acculturative stress of Latines (Bekteshi & Kang, 2018).

The relationship between acculturation and acculturative stress has been established throughout literature (Berry, 2006; Berry et al., 1987; Caplan, 2007; Driscoll & Torres, 2013; Lara et al., 2005; Torres et al., 2012). Based on acculturation literature, Rudmin (2009) presents a model of acculturation and acculturative stress in a five-stage model (Figure 2) where acculturative stress occurs at different points within the acculturation process. The first experience of acculturative stress occurs at the initial contact with a second culture, whereas the second experience occurs after an individual has applied an acculturation strategy and made cultural changes (Rudmin, 2009). Support for this model has been documented in subsequent investigations. In a study of Cuban and Nicaraguan immigrant families, researchers found a curvilinear relationship between level of acculturation (years in the U.S) and acculturative stress, where high stress was reported in the first two years after

immigration, decreased between 3 to 10 years after immigration, and increased again after 10 years (Gil & Vega, 1996).

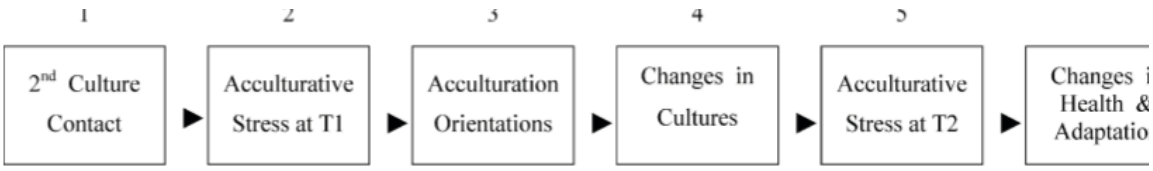


Figure 2. Five-stage Model of Acculturation and Acculturative Stress
(Rudmin, 2009)

Berry postulated that the experience of acculturative stress might be more or less difficult for individuals based on their autonomy of choice to participate in the acculturation process (Berry et al., 1987). As such, an individual's coping resources can influence whether the acculturation process results in positive or negative outcomes. There is some evidence which suggests that autonomy of choice can be less influential than discrepancy in expectations and experiences of life quality pre- and post-migration. Researchers found that discrepancies between pre-migration expectations and post-migration experiences in a sample of Latine adults were associated significantly with more acculturative stress (Negy et al., 2009).

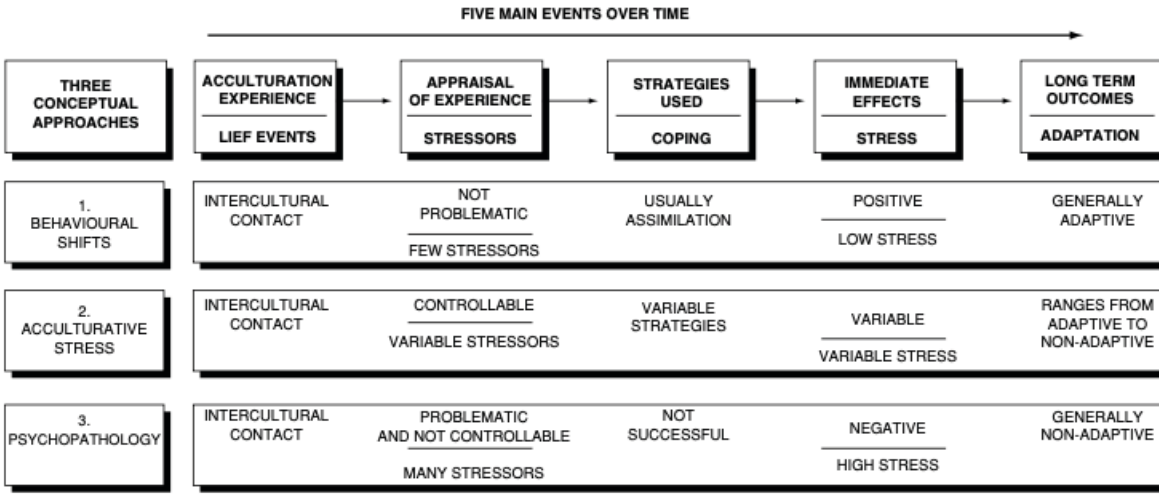
Acculturation, Acculturative Stress and Mental Health

A growing body of literature suggests that acculturation and acculturative stress have an overall negative effect on health behaviors and an association with higher rates of psychiatric disorders (Abraido-Lanza et al., 2016; Burnett-Zeigler et al., 2013; Driscoll & Torres, 2013; Duarte et al., 2008; Falavarjani et al., 2019; Finch et al., 2004; Finch & Vega, 2003; Gil & Vega, 1996; Gold & Acevedo-Garcia, 2005; Henkin et al., 2011; Lara et al.,

2005; Ortega et al., 2000). Although Latines have been found to have better mental health than NLW (Substance Abuse and Mental Health Services Administration, 2018), more acculturation to American culture may erode this health advantage. Ortega and colleagues found that odds of having any DSM-III psychiatric disorder increased for more acculturated (spoke English at home) Mexican Americans (OR = 3.0, 95% CI = 1, 9.6) (Ortega et al., 2000). In a study of the relationship between acculturation and psychiatric disorders, higher levels of acculturation were associated with increased odds of having any lifetime psychiatric disorder (AOR = 1.033; CI = 1.024, 1.042) for those who identified as Latine, including any anxiety disorder (Burnett-Zeigler et al., 2013). The literature suggests that negative effects of acculturation on mental health may be a result of the stressors associated with the acculturation process: acculturative stress.

Acculturative stress has been linked with a host of mental health problems including depression, personality disorders, post-traumatic stress disorder, anxiety disorders, and psychological distress in Latines (Burnett-Zeigler et al., 2013; Ortega et al., 2000). Berry provides three approaches to conceptualizing possible outcomes of acculturation (Figure 3) (Berry, 2006). As such, acculturative stress can result in long term maladaptive outcomes. In a review of the acculturation literature (30 studies of the Latine population included in the analysis), acculturative stress was found to be positively associated with psychiatric disorders and poor mental health (Bekteshi & Kang, 2018). Research on older Mexican immigrants and Mexican Americans has found that more acculturated individuals report more acculturated stress and symptoms of depression (Cuellar et al., 2004). Latines who are highly acculturated have also reported greater negative effects of acculturative stress (in the form of language conflicts and discrimination) on mental health than those with lower levels of

acculturation (Finch et al., 2004). Experiences of acculturative stress may increase risk of PD in Latine population and symptoms of anxiety may in turn increase perceptions of acculturative stress.



Acculturative stressors may impact asthma-PD comorbid individuals' subjective interpretation of asthma as stressed induced (Vazquez et al., 2017). PD patients are prone to both trait anxiety (generalized anxiety) and anxiety sensitivity (fear of anxiety symptoms) (McNally, 2002). Acculturative stress experiences in Latines have been found to be associated with state/trait anxiety (Maldonado et al., 2018). Latines experiencing PD may be at higher risk of acculturative stress as a result of increased anxiety sensitivity characteristic of PD. In a study of 142 Latines living the in the U.S., anxiety sensitivity explained 3-9% of the variance in acculturative stress (Viana et al., 2020), suggesting that Latines with PD, who tend to experience more anxiety sensitivity, might be at higher risk of experiencing acculturative stress through the acculturation process. Little to no research exists on the

mechanisms by which acculturation and acculturative stress affect panic severity, highlighting the importance of investigating this relationship.

Acculturation, Acculturative Stress, Cardiorespiratory Symptoms and Confusion Between Asthma and PD symptoms

Asthma and PD have a similar symptomatology. Asthma patients with PD tend to report worse asthma outcomes than those without PD, despite no differences in pulmonary function (Boudreau et al., 2015). Previous theories postulate that PD results in worse self-reported asthma outcomes due to misattribution or catastrophizing of panic-related somatic symptoms (i.e. dyspnea) as asthma symptoms (Amaral et al., 2013; Van Peski-Oosterbaan et al., 1996). Symptom overlap (dyspnea, choking and smothering sensations, rapid breathing) may lead individuals with asthma-PD, who experience generalized anxiety, to confuse symptoms, resulting in overuse of short-acting β_2-agonists medications (bronchodilators) (Kinsman et al., 1980). Overuse of bronchodilator medications can result in somatic side effects similar to panic, such as increased heart rate, tremors, and sweating (Billington et al., 2017), further exacerbating feared bodily sensations and creating a maladaptive cycle (Feldman et al., 2000). Puerto Rican adults have higher rates of asthma and PD, as well as greater use of bronchodilator medications (Feldman et al., 2010), as such, they may be at greater risk of symptom confusion. To our knowledge, no validated instrument exists for measuring symptom confusion between asthma and PD, presenting a significant challenge and urgent need in the treatment of comorbid asthma-PD.

The overlap of physical symptoms between asthma and PD may contribute to symptom confusion in Latine individuals. Previous researchers have noted the expression of

panic in symptom clusters ranging from respiratory to vestibular symptoms (Sansone & Sansone, 2009). Briggs et al. (1993) found support for a non-respiratory subtype and a respiratory subtype of PD, characterized by feelings of choking, smothering sensations, shortness of breath, chest pain or tightness, numbness or tingling sensations, and fear of dying during a panic attack. Meuret et al. (2006) expanded the subtypes through factor analysis and identified a three-factor solution yielding three PD symptom subtypes: cardio-respiratory (feelings of choking, smothering sensations, shortness of breath, chest pain or tightness, numbness or tingling sensations, heart palpitations, and fear of dying during a panic attack), mixed-somatic (sweating, trembling, nausea, chills/ hot flashes, and dizziness), and cognitive (feeling of unreality, fear of going crazy, and fear of losing control). Furthermore, individuals with comorbid asthma were more likely to fall in the cardiorespiratory PD subtype (Meuret et al., 2006). Although no research has directly investigated this PD subtype in Latine populations, Latines in nationally representative samples have been found to report more respiratory symptoms and heart palpitations than NLW (Bauer et al., 2012).

Echoing the "Hispanic Health Paradox," previous research has found that higher levels of acculturation in Latine populations are associated with more self-reported physical symptoms (Bauer et al., 2012). In a study of Mexican American undergraduate students, bicultural and acculturated individuals reported more severe headaches than those less acculturated (Montgomery, 1992). Extrapolating these findings to symptom overlap between asthma and PD, higher levels of acculturation could further complicate misattribution of respiratory panic symptoms as those of asthma in Latine populations.

It has been proposed that cultural components may further contribute to symptom confusion in Latines. *Ataques de nervios* ("attack of nerves;" ADN) is a cultural syndrome in Latines involving symptoms of emotional upset (anxiety), trembling, uncontrollable screaming or crying, aggressive or suicidal behavior, depersonalization or derealization, and a sense of being out of control (American Psychological Association, 2013). ADN differ from panic attacks in that they are typically of longer duration (American Psychological Association, 2013). Despite overlapping symptomatology, ADN and PD are distinct conditions. Unlike PD, ADN typically occur in relation to stressful family events (American Psychological Association, 2013). In a clinical sample of Dominican and Puerto Rican adults in New York, 72% reported a lifetime history of ADN (Lewis-Fernández et al., 2002). In the sample, 36% of *ataques* met criteria for panic attacks and 17% met criteria for PD (Lewis-Fernández et al., 2002). As a result of overlapping symptomatology and comorbidity between ADN and PD, Latine individuals might be at greater risk of symptom confusion between panic and asthma symptoms.

Although ADN is categorized as a cultural syndrome AND doesn't occur at higher rates in Latine individuals who are less acculturated to American culture. In a study of a culturally diverse sample (African Americans, Euro-Americans, and Latines) of undergraduate students ADN was not found to significantly vary among groups or by level of acculturation in Latines (Keough et al., 2009). These findings suggest that ADN is not unique to Latine populations and manifests at similar rates in non-Latine groups. Perhaps ADN is a cultural idiom rather than a culturally bound syndrome. Unlike for rates of PD, acculturation and acculturative stress have not been found to be associated with rates of ADN in Latines (Alcántara et al., 2012; Bayles & Katerndahl, 2009); and although participants' knowledge of

culturally bound syndromes has been found to decrease with increased acculturation, knowledge of ADN remains high (96%) among more acculturated Latines (Bayles & Katerndahl, 2009). In addition to higher reporting of physical symptoms in more acculturated Latines, cultural factors, such as ADN, may contribute to symptom confusion.

Acculturation, acculturative stress, and pulmonary functioning

Pulmonary function can be objectively measured by spirometry, a reliable screening test that is considered the "gold standard" in pulmonary function measurement (Criée et al., 2015). Spirometry is the main test used for detection and measurement of airway obstruction in children and adults (Gallucci et al., 2019). Spirometry measures several aspects of lung function, including total air volume forcibly expired from the lungs after inhalation (FVC), total volume of air exhaled in the first second during maximal effort (FEV_1), and the percentage of the total air volume exhaled in one second (FEV_1/FVC) (Johnson & Theurer, 2014). The FEV_1 and FEV_1/FVC values are the most commonly used measures to assess airflow obstruction (NHLBI, 2007). In a longitudinal study, low FEV_1/FVC was found be associated with airway hyperresponsiveness and lower lung function in adults at 18 and 26 years (Rasmussen et al., 2002).

Mixed results have been reported relating to the relationship between acculturation and asthma, with some literature suggesting acculturation is related to better asthma outcomes (Wisnivesky et al., 2009; Wisnivesky et al., 2012), whereas other literature points to worse outcomes (Gold & Acevedo-Garcia, 2005; McQuaid, 2017). In a study of acculturation's association with self-reported diagnosis of respiratory disease in Puerto Ricans, researchers found that high psychological acculturation and perceived stress were significantly associated with self-reported respiratory disease (Henkin et al., 2011). However,

little research has examined the relationship between acculturation, acculturative stress, and pulmonary function. A recent study assessing pulmonary function in Latine children found higher FEV_1 and lower bronchodilator response for children with mothers who were more acculturated (Thakur et al., 2019). However, the same study also found that acculturation was associated with greater odds of having asthma (Thakur et al., 2019). These findings suggest a complex relationship. Perhaps experiences of stress associated with the process of acculturation manifest as a risk factor for asthma and reduced bronchodilator response in the more acculturated group (Thakur et al., 2019). Alternately, acculturation's association with better lung function (FEV_1) might suggest better asthma control (Thakur et al., 2019). Although no research exists on the relationship between pulmonary function and acculturative stress specifically, previous literature on stress and pulmonary function does exist.

Emotions and stress have been shown to negatively affect lung function in patients with asthma (Isenberg et al., 1992). While acute stress (mildly stressful tasks) has been observed to result in temporarily improved pulmonary function (Lehrer et al., 1996; Smyth et al., 1999), patterns of stress that involve emotion appear to have an opposite effect (Isenberg et al., 1992; Lehrer et al., 2002). Schmaling and colleagues found significant decreases in Peak Expiatory Flow (PEF) after relationship problem discussions between asthma patients and their partners, where an increase in anger was associated with lower PEF (Schmaling et al., 2009). In a study examining the associations of negative affect and daily hassles with pulmonary function, increased negative affect was associated with decreased FEV_1 and increases in airway inflammation for participants with asthma, whereas daily hassles were associated with higher FEV_1 (Kullowatz et al., 2008). While acute stressors may be

associated with better lung function, the additional psychological strain resulting from acculturative stress may contribute further to the negative impact of long-term, chronic stress on pulmonary function.

Study Rationale

Due to a gap in the literature, the present study analyzed the associations of acculturation and acculturative stress on panic severity, asthma-PD symptom confusion, and pulmonary function in 53 Latine (primarily Puerto Rican females) adults, ages 18 and up, with comorbid asthma-PD in the Bronx. A secondary analysis was conducted of data from the first two sessions of a larger longitudinal, randomized control trial (1R34MH087679- 01, National Institute of Mental Health, PI: J. Feldman) completed between 2010 and 2013. The aforementioned variables were assessed through the use of the following measures: Language Preference and Proficiency Questionnaire (LPPQ), Ethnic Identity Scale (EIS), nativity status (U.S. born vs. foreign-born), Cultural Stress Scale (CSQ), Panic Disorder Severity Scale (PDSS), a single-item clinician rating on confusion between asthma and panic symptoms, and objective pulmonary function measures (FEV_1/FVC; FEV_1).

Specific Aims

Aim 1. To examine the relationships between acculturation (language proficiency, ethnic identification, and nativity) and panic severity.

Hypothesis 1. Greater linguistic acculturation, greater mainstream U.S. identification, and Mainland U.S. born status will be associated with greater panic severity.

Aim 2. To examine the relationships between acculturation (language proficiency, ethnic identification, and nativity) and cardio-respiratory symptoms during panic attacks, fear of dying during panic attacks, and symptom confusion between asthma vs. PD symptoms.

Hypothesis 2a. Greater linguistic acculturation, greater mainstream U.S. ethnic identification, and Mainland U.S. born status will be associated with a greater number of cardio-respiratory symptoms during panic attacks.

Hypothesis 2b. Greater linguistic acculturation, greater mainstream U.S ethnic identification, and Mainland U.S. born status will be associated with a higher level of fear of dying during panic attacks.

Hypothesis 2c. Greater linguistic acculturation, greater mainstream U.S identification, and Mainland U.S. born status will be associated with greater clinician-rated symptom confusion.

Aim 3. To explore the relationship between acculturative stress, panic severity, symptom confusion between asthma vs. PD symptoms, and pulmonary function (FEV_1/FVC; FEV_1).

Hypothesis 3a. Greater acculturative stress will be associated with greater panic severity.

Hypothesis 3b. Greater acculturative stress will be associated with greater clinician-rated symptom confusion.

Hypothesis 3c. Greater acculturative stress will be associated with decreased pulmonary function measured by FEV_1/FVC and FEV_1.

Chapter II: Methods

Description of the Study:

This study conducted a secondary analysis of data from the first two sessions of an NIH-funded grant entitled "Adaptation of a Behavioral Treatment for Latines with Panic Disorder and Asthma" (1R34MH087679- 01, National Institute of Mental Health, PI: J. Feldman). The study aimed to analyze the relationship between acculturation and panic severity (Specific Aim1); acculturation cardiorespiratory symptoms during panic attacks, fear of dying during panic attacks, and asthma-PD symptom confusion (Specific Aim 2); and the association of acculturative stress with panic severity, symptom confusion, and pulmonary function (Specific Aim 3). The sample consists of 53 Latine (primarily Puerto Rican females) adults, ages 18 and older, with comorbid asthma-PD who participated in the larger study. Acculturation was assessed through two scales of the Language Preference and Proficiency Questionnaire (LPPQ), Ethnicity Identification Scale (EIS), and U.S. born nativity. Acculturative stress was measured by the Cultural Stress scale (CSQ). Panic severity was assessed through the Panic Disorder Severity Scale (PDSS). Cardio-respiratory symptoms during panic attacks were assessed based on five clinician-rated items from a differential diagnosis worksheet informed by a thorough semi-structured interview aimed at establishing differential diagnosis between asthma and PD. Fear of dying and symptoms confusion were assessed based on single-item clinician ratings from the same worksheet. Pulmonary function was assessed by spirometry derived values of FEV_1/FVC and FEV_1.

The "Adaptation of a Behavioral Treatment for Latinos With Panic Disorder and Asthma" study was a longitudinal RCT, which analyzed the efficacy of eight sessions of culturally adapted Cognitive Behavioral Psychophysiological Therapy (CBPT) and Music and Relaxation Therapy (MRT) interventions for the treatment of PD in asthma-PD Latine adults (Feldman et al., 2016). The interventions were introduced after the second of the seven assessment sessions. The EIS, nativity status, PDSS, symptom confusion rating, and pulmonary function testing were collected at the first session. The LPPQ and CSQ were administered at the second session. Participants were paid at the first session ($25) and were provided Metro Cards for transportation; participants did not receive a payment at the second session Due to the longitudinal treatment quality on PD of the broader study, a cross-sectional design is best suited to analyze data gathered at the first and second sessions, prior to commencement of the treatment interventions and possible treatment effects on PD and asthma control.

Clinical Sites and Participant Population

Participants who identified as Latine, having an asthma diagnosis, age 18 years and older were recruited between 2010 and 2012 in the Bronx, NY. Participants were recruited via mailings from providers, outpatient clinics, the emergency room of Jacobi Medical Center and North Central Bronx Hospitals, and other sources (e.g., flyers). In the Bronx, Latines make up 56.6% of the population (United States Census Bureau, 2018). This is important to the study due to the high rate of asthma-PD comorbidity among Latines. The target sample size for the RCT was 50 participants. 53 participants were enrolled and completed the first two session of the larger study. The available sample of the RCT was used for this study.

Recruitment and Screening

A total of 485 self-identified "Latino" asthma patients who were recruited via previously mentioned methods. Individuals were initially screened at the recruitment site or by phone in either Spanish or English by doctoral psychology students trained to differentiate between PD and asthma. Prospective participants were provided verbal and written informed consent and HIPAA authorization prior to administration of the PD section of the PRIME-MD Patient Health Questionnaire (PHQ) (Spitzer et al., 1999) in order to screen for PD. Additionally, a brief eligibility screening form (ESF) was administered to determine eligibility based on the inclusion/exclusion criteria.

Inclusion/Exclusion Criteria

Inclusion criteria in this study included the following: a) adults age 18 years or older who identified as Latino; b) fluency in English or Spanish; c) current asthma diagnosis, as per inclusion criteria described below; d) DSM-IV criteria for current PD (with or without agora- phobia) assessed at the first session via the Structural Clinical Interview for DSM-IV Axis-I disorders (First et al., 2002) and the Panic Disorder Severity Scale (PDSS) (Shear et al., 1997) rating $\geq$8; and e) no changes in prescribed levels of psychotropic medication for two months prior to the study and during the two months of the active treatment protocol.

Asthma diagnosis was confirmed at the first session through an electronic medical chart review according to NHLBI Guidelines for the Diagnosis and Management of Asthma (NHLBI, 2007) and spirometry tests of pulmonary function. Evidence of a history of episodic asthma symptoms was required, in addition to that of airflow obstruction (i.e., $FEV_1 < 80\%$ predicted and $FEV_1/FVC < 65\%$ or below the lower limit of normal). Medical record documentation was used to confirm at least partially reversible airflow obstruction, as

demonstrated by either a) a positive bronchodilator test during past year; b) a positive bronchodilator test during past 10 years and asthma symptoms reported during past year; c) improvements in PEF of > 20% over past 10 years and asthma symptoms reported during past year; or d) clinical improvements in asthma symptoms after the initiation of anti-inflammatory medication. Dr. Chang Shim, a board-certified pulmonary physician, determined asthma severity and assigned ratings (i.e., intermittent, mild persistent, moderate persistent, and severe persistent) according to NHLBI guidelines (NHLBI, 2007) based on information collected at the first session.

Diagnosis of PD was confirmed via the bilingual version of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-IV), Research Version, Patient Edition (First et al., 2002) according to DSM-IV criteria for differential diagnosis of Axis I disorders. The SCID-IV was administered by doctoral students in clinical psychology under the direct supervision of licensed clinical psychologists. Interviewers were provided extensive training on differential diagnosis of asthma versus PD and determined reliable to conduct SCID-IV interviews by Dr. Feldman and clinical supervisors. Dr. Feldman and colleagues then reviewed videotapes of SCID-IV administration sessions and discussed any questionable diagnoses to reach a diagnostic consensus. The PDSS (Shear et al., 1997) was administered and as an additional method for confirming PD diagnosis, and followed the same process described for the SCID-IV above.

Exclusion criteria for this study included a) an active bipolar disorder, psychosis, mental retardation, or organic brain syndrome; b) current alcohol or substance abuse/dependence; c) foreign body aspiration, vocal cord dysfunction, or other pulmonary diseases due to respiratory symptoms which may be confused with symptoms of asthma; d) a

history of smoking 20 pack-years or more; and e) current participation in other psychotherapy for anxiety or panic.

Measures

The present study focuses specifically on measures of acculturation, acculturative stress, panic severity, asthma vs. panic symptom confusion, and pulmonary function. Measures were translated from English-to-Spanish by the Institute for Clinical and Translational Research at Einstein and Montefiore (Feldman et al., 2016). Subsequently, translated measures were reviewed and wording that is common across Latine ethnic groups included in this study was selected. Spanish versions were translated back to English to ensure that all items retained their original meaning. This process was specifically employed for measures that lacked Spanish translations.

Table 1. *Primary and Secondary Measures*

Measures	**Construct**	**Type**	**Administration or Clinician-Rated Timepoint**
Primary Predictors			
Language Preference and Proficiency Questionnaire English Language Proficiency (ELP) Spanish Language Proficiency (SLP)	 Linguistic Acculturation Linguistic Enculturation	 Continuous Continuous	Second session
Ethnic Identification Scale	Ethnic acculturation or enculturation	Continuous	First session
Cultural Stress Questionnaire	Acculturative stress	Continuous	Second session
Primary Outcomes			
Panic Disorder Severity Scale (PDSS)	Panic severity	Continuous	First session
Cardiorespiratory Symptoms (CR)	Number of self-reported cardiorespiratory	Dichotomous: Median-split	First session

	symptoms during a panic attack		
Fear of Dying	Presence of fear of dying during a panic attack	Dichotomous	First session
Symptom Confusion	How often symptoms of asthma and panic can be distinguished	Dichotomous	First session
Percent of FEV_1/FVC	Objective measure of asthma control	Continuous	First session
Percent of FEV_1 Predicted	Objective measure of asthma control	Continuous	First session
Secondary			
Anxiety Sensitivity Index-3 (ASI-3)	Beliefs about negative consequences of experiencing asthma symptoms	Continuous	First session
Body Sensations Questionnaire (BSQ)	Level of fear felt when experiencing bodily sensations that can occur during a panic attack	Continuous	First session
Agoraphobia Cognitions Questionnaire (ACQ)	Catastrophic thoughts related to experiencing anxiety	Continuous	First session
Beck Depression Inventory-II (BDI)	Depression	Continuous	First session

Basic Demographic Information:

Age, race, ethnicity, number of years living in the U.S., parental nativity, age of arrival to the mainland U.S. if not born in U.S., and migration information was collected at the first session by self-report. Participants were also asked to report household income, health insurance, education, marital status, and employment status.

Acculturation:

The Spanish and English language proficiency scales of the Language Preference and Proficiency Questionnaire (LPPQ) assessed linguistic acculturation. These two scales include six items that assess an individual's perception of their English or Spanish language proficiency. English language proficiency is often used as an indicator of linguistic acculturation (Becerra et al., 2015). Participants (N=6) who responded "No" to a preliminary question "Have you ever spoken, written, or read in Spanish?" were not administered these two scales. The Spanish and English language proficiency scales originated from the Cultural Identity Scales for Latino Adolescents (Felix-Ortiz et al., 1994). Three items assess English proficiency, and three items assess Spanish proficiency; lower scores indicate a lower level of proficiency in either English or Spanish while higher scores indicate a higher level of proficiency. Response categories range from 1 (poor) to 4 (excellent). English and Spanish versions have demonstrated strong criterion validity and strong test-retest reliability and internal consistency (Cronbach $\alpha = 0.90$ and 0.96, respectively (Alegria et al., 2004; Felix-Ortiz et al., 1994).

The Ethnic Identity Scale (EIS) is a 4-item scale that measures participants' identification with members of their own ethnic group, as well as closeness of ideas and time spent with ethnic group members (Alegria et al., 2007). The EIS originated from the Cultural Identity Scales for Latino Adolescents (Felix-Ortiz et al., 1994). Lower values in total score indicate higher Latine ethnic identity. The EIS has shown good reliability ($\alpha = .75$) (Alegria et al., 2007) and strong discriminant validity (Felix-Ortiz et al., 1994).

Nativity (Mainland U.S.-born or foreign-born) was assessed via self-report at the first session. Participants were asked "In what country were you born?" with response options including Unites States, Puerto Rico, or Mexico. Response options for countries in Central

and South America were available with an opportunity for the respondent to write in the country of birth. Nativity status has been used as a practical proxy for acculturation throughout the literature (Lara et al., 2005); and U.S. nativity has been associated with psychiatric illnesses (Ortega et al., 2000) and psychological distress (Torres et al., 2012).

Acculturative Stress:

The Cultural Stress Questionnaire (CSQ) is a 23-item scale derived from the Hispanic Stress Inventory (Cervantes et al., 1990). It was administered at session two to assess various aspects of stress associated with acculturation within the past year. Each item is scored using a 3-point scale, 0 (never/rarely), 1 (sometimes), and 2 (often). A total score is derived by averaging the sum of all items, with higher scores indicating more acculturative stress. The original scale demonstrated strong psychometrics, including strong criterion validity and strong reliability (α =. 85 U.S born; .77 immigrant) (Cervantes et al., 1990), and is correlated with psychiatric symptoms (Duarte et al., 2008).

Panic Severity:

The Panic Disorder Severity Scale (PDSS) (Shear et al., 1997) measured the severity of PD during the past month. Clinicians rated the severity of seven dimensions of PD and associated symptoms including: frequency of panic attacks; distress during panic attacks; anticipatory anxiety (worry about future panic attacks); agoraphobic fear and avoidance; interoceptive fear and avoidance (i.e., apprehension and avoidance of bodily sensations); impairment of or interference in work functioning; and impairment or interference in social functioning. Ratings range from 0 (None) to 4 (Extreme) for each item. Anchors of severity for PDSS total scores are as follows: 0-3 = “Normal”; 4-5 = “Borderline ill”; 6-9 = “Mildly ill”; 10-16 = “Moderately ill”; 17-21 = “Markedly ill” and 22-28 = “Severely ill” (Keough et

al., 2012). A composite score is derived by averaging the scores on the seven items, with higher scores denoting higher panic severity (Shear et al., 1997). The PDSS has high internal consistency (Cronbach's $\alpha = 0.88$), good inter-rater and test-retest reliability, and well-established convergent and discriminant validity (Shear et al., 2001).

Cardiorespiratory Symptoms, Fear of Dying, and Asthma vs. PD Symptom Confusion:

Cardiorespiratory (CR) symptoms, fear of dying, and asthma vs. PD symptom confusion were assessed by clinician-rated items identifying the presence of symptoms consistent with Meuret et al. (2006) cardiorespiratory PD subtype (palpitations, shortness of breath, choking, chest pain, numbness and fear of dying) and one clinician rating of asthma/PD confusion from a 37-item Asthma-Panic Disorder Differential Diagnosis rating worksheet, developed for this study and not previously validated. Interviewers were extensively trained on techniques used to differentiate between asthma and PD. Differential diagnosis was completed by interviewers after completion of SCID-IV and PDSS measures. The worksheet included several questions to assess for symptoms that are indicative of asthma attacks (e.g., wheezing, coughing, mucus production) versus panic attacks (i.e., poor concentration, frequent yawning, or sighing).

Interviewers rated whether participants experienced each of the 13 DSM-IV PD symptoms as part of panic vs. asthma attacks. For the purpose of this study, we examined the five physical (palpitations, shortness of breath, choking, chest pain, and numbness) and one cognitive symptoms (fear of dying) of the cardiorespiratory PD subtype described by Meuret et al. (2006). Patients with comorbid asthma and PD tend to report more cardiorespiratory symptoms than those without asthma (Meuret et al., 2006).

Guided by the worksheet, interviewers asked "How can you tell when you are having an asthma attack versus a panic attack? How often can you tell the difference? Do you ever get confused?" to best determine the participant's understanding of asthma and panic triggers. Additionally, participants were asked whether symptoms during an attack were always relieved by bronchodilators (indicative of asthma) and whether they experience anxiety after using bronchodilators (indicative of panic). Additionally, interviewers rated "Your assessment of the participant's ability to distinguish between symptoms of panic and symptoms of asthma," using a 5-point scale from 1 ("Always can distinguish between asthma and panic") to 5 ("Never can distinguish between asthma and panic").

Pulmonary Function:

Spirometry measures were obtained at the first session using a portable, clinical spirometer (KoKo, PDS, CO) with equipment specifications that met or exceeded American Thoracic Society standards (ATS, 1995). At least three forced expiratory maneuvers were conducted until equivalent results were achieved. The FEV_1/FVC and percent predicted value of FEV_1 were used as objective measures of pulmonary function (NHLBI, 2007).

Secondary Measures

In addition to the PDSS, the following measures were used to explore the validity of CR symptoms, fear of dying, and symptom confusion items from the Asthma-Panic Disorder Differential Diagnosis rating worksheet:

The Anxiety Sensitivity Index-3 (ASI-3) is an 18-item measure that assesses beliefs about the negative consequences of experiencing anxiety symptoms (Taylor et al., 2007). The scale consists of three subscales of anxiety sensitivity: physical, cognitive, and social concerns (Taylor et al., 2007). Participants rate each item on a 5-point scale ranging from

"very little" to "very much." Items are summed for each subscale and the entire scale, with higher scores indicating greater anxiety sensitivity. The social concerns (α= .80), physical concerns (α= .88), and cognitive concerns subscales (α= .90) have good internal consistency (Wheaton et al., 2012). The physical concerns subscale is associated with panic (Olthuis et al., 2014). The ASI-physical and cognitive subscales were used to assess validity of CR symptoms and fear of dying variables, respectively. Both subscales were used to explore validity of the symptom confusion item.

The Body Sensations Questionnaire (BSQ) is a 17-item measure used to assess the level of fear felt when experiencing bodily sensations that can occur during a panic attack (Chambless et al., 1984). The measure is scored on a 5-point scale ranging from "not at all" to "extremely and the mean is reported, with higher scores indicating greater experience of fear during bodily sensations. The BSQ has good reliability (α= .87), discriminant, and construct validity (Chambless et al., 1984) and was used to assess validity of the CR symptoms and symptom confusion variables.

The Agoraphobia Cognitions Questionnaire (ACQ) consists of 14 items, which assesses catastrophic thoughts related to experiencing anxiety (Chambless et al., 1984). The items range from 1 to 5 and the mean score is reported, with higher scores indicating greater occurrence of negative thoughts. The ACQ has good reliability (α= .87), discriminant, and construct validity (Chambless et al., 1984). The ACQ was used to assess validity of the CR symptoms, fear of dying, and symptom confusion variables.

The Beck Depression Inventory-II (BDI) is the most widely used measure of depression (Beck et al., 1996). The 21-item scale was used to assess depressive symptoms during the previous two weeks. Items are range from 0 to 3, with scores summed and higher

values indicating greater presence of depressive symptoms. Both the English and Spanish versions of the BDI have excellent internal consistency (α= .89; α= .90, respectively), test-retest reliability (ICC=.73; p<.001; ICC=.86; p<.001, respectively) and construct validity (Wang & Gorenstein, 2013). The BDI was used to assess validity of the CR symptoms, fear of dying, and symptom confusion variables.

Data Collection and Statistical Analyses

Power and Sample Size

G*Power 3.1 was used to estimate the power needed to produce accurate and reliable results for the established sample (*n*=53).

Specific Aim 1

The relationship between acculturation proxies and panic severity has not been previously studied. However, previous studies have found that English language use and proficiency (AOR=1.02, 95% CI=1.01-1.03), lower ethnic identification (AOR=.98, 95% CI=.97-.99) (Burnett-Zeigler et al., 2013), and U.S. nativity (OR=3.8, 95% CI= 1.8- 7.9) (Ortega et al., 2000) are associated with higher prevalence of psychiatric disorders.

A power analysis was conducted for an F-test for linear multiple regression with a fixed model, R^2 increase to compute the power, given small, medium, and large effect sizes, $\alpha = 0.05$, 3 covariates and 4 main effect predictors (English and Spanish language proficiency, ethnic identification scale, and nativity), and a sample of 53. Results of the analysis suggested that a medium-large effect size of 0.25 (power=.80) or higher should yield adequate power.

Table 2. *Power analyses for Specific Aim 1*

Power	**Effect Size**	**Sample Size**
.10	Small (.02)	53
.55	Medium (.15)	53
.92	Large (.35)	53

Specific Aim 2

To our knowledge, no previous studies have investigated the relationship between acculturation proxies, CR symptoms, fear of dying during a panic attack, and symptom confusion between asthma and PD symptoms. The confusion may arise due to the similarity in respiratory symptoms for both illnesses. Previous research suggests that US. born Latines (OR=.64, p=.03) have more physical symptoms than foreign born Latines (Bauer et al., 2012) and patients with comorbid asthma-PD have more cardiorespiratory symptoms than those without PD (t(340)=2.42; p=.016; (Meuret et al., 2006)). Given that the predictor variables for aim 1 and aim 2 are the same, the results of power analysis explained above is the same for both aims.

Specific Aim 3

Although the relationship between acculturative stress and panic severity, symptom confusion, and pulmonary function has not been directly investigated, studies of similar variables suggest the effect size we might expect. In a study investigating the relationship between acculturative stress and severity of depression symptoms, greater acculturation was correlated with greater depression (r=.28, p<.05) (Driscoll & Torres, 2020). A study examining change in airflow and mood in patients with asthma found significant decreases in airflow after participants discussed relationship problems with their partners. Specifically, greater experience of anger was associated with decreased airflow (R^2 change=.02; b=–.15, p < .01) (Schmaling et al., 2009).

A power analysis was conducted for an F-test for linear multiple regression with a fixed model, R^2 increase to compute the power, given small, medium, and large effect sizes,

$\alpha = 0.05$, 3 covariates and 1 main effect predictor (Cultural Stress Questionnaire), and a sample of 53. Results of the analysis suggested that a medium effect size or higher should yield adequate power. Considering the sample size and estimated number of covariates is the same for the dependent variables (Panic Disorder Severity Scale, asthma-PD symptom confusion rating, FEV_1/FVC, and FEV_1), the results of the same power analysis are applicable to the hypotheses of aim 3.

Table 3. *Power Analyses for Specific Aim 3*

Power	**Effect Size**	**Sample Size**
.17	Small (.02)	53
.79	Medium (.15)	53
.99	Large (.35)	53

Data Management and Preparation

Data was analyzed using IBM SPSS Software 27.0. Firstly, descriptive statistics and graphs were used to assess the sample's demographic characteristics (Table 4). Means and standard deviations were calculated for age and years in the U.S. The median and interquartile ranges were calculated for age at migration to the U.S. to account for a non-normal distribution. Percent totals per category were calculated for the following demographic variables: gender, race, ethnicity, place of birth, total household income, highest level of education completed, marital status, and health insurance coverage in the past 12 months. Subsequently, descriptive statistics were analyzed for all study variables. Due to cell size considerations the following variables were dichotomized for analysis: Race

(Other, White-Hispanic); Ethnicity (Other, Puerto Rican); Country of birth (Foreign-born; US mainland,).

Acculturation was measured by three proxies. Nativity was initially reported in three categories (US; Puerto Rico; Other) and was dichotomized to "foreign-born" and "U.S. mainland born to account for small cell size of the "Other" category. For the English proficiency (ELP) and Spanish proficiency (SLP) subscales of the LPPQ, an average score for each was calculated for each individual participant ranging from 0-4; both measures were treated as continuous variables. Similarly, for the Ethnic identification (EIS) and the Cultural Stress Questionnaire (CSQ) an average score was calculated, ranging from 1-3.75 and 0-1.20 respectively; higher scores indicated more acculturation and more acculturative stress. This study's analyses focused on the associations between acculturation proxies, acculturative stress and panic severity, cardiorespiratory symptoms during a panic attack, fear of dying during a panic attack, asthma and PD symptom confusion, and pulmonary function. Panic severity (PDSS) and objective measures of pulmonary function (FEV_1/FVC; FEV_1) were treated as continuous variables. CR symptoms were dichotomized to some symptoms (1-3) and most symptoms (4-5), as the count data did not fit any type of Poisson regression. Fear of dying was also analyzed as a dichotomous variable (not present; present). Symptom confusion was split dichotomously (always/often can distinguish between PD and asthma; sometimes/rarely can distinguish) due to a non-normal distribution that did not normalize when transformed. Predictor and outcome variables were visually inspected with bar graphs, scatterplots, and histograms to assess normality of distributions. Multicollinearity between acculturation proxies was assessed through the use of Spearman's rho and t-tests (Table 7) and inspection of variance inflation factors.

In order to assess whether there were additional variables (outside of the variables analyzed for each of the three aims) that impacted associations Pearson correlations, Spearman's Rho's, t-tests, Fischer's exact tests, Mann-Whitney U tests, Chi Square tests, and ANOVAs were used to examine the relationships between demographics and outcome variables. Relationships graphed and visually inspected. Values three standard deviations of more from the mean were considered outliers and identified through visual inspection of box plots; these values were removed when normality tests suggested an asymmetric distribution. Covariates were chosen based on the literature and significant associations with the outcome variables and were included in the main analyses to determine if the covariates had significant predictive power. The following variables were tested as potential covariates for hypotheses across all three aims due to previously established associations with the outcome measures: age, marital status, education, household income, and place of birth (Alegria et al., 2007; Burnett-Zeigler et al., 2013; Salazar et al., 2016). Ethnicity was also tested as a potential covariate given that Puerto Rican patients with asthma have been found to be more likely to have PD and worse asthma control and morbidity than other ethnic groups (Feldman et al., 2010; Koinis-Mitchell et al., 2011; Salazar et al., 2016; Scheckner et al., 2015). Race, place of birth, and years in the U.S were tested as covariates due to associations with greater physical symptoms (shortness of breath and palpitations) in U.S.-born Latines compared to NL-Whites, foreign-born Latines, and those less acculturated (Bauer et al., 2012). Exploratory analyses were conducted to assess for associations between demographic variables and confusion between asthma and panic.

Given that the Asthma-Panic Disorder Differential Diagnosis rating worksheet has not been previously validated, bivariate correlations with the PDSS, ASI-3, BSQ, ACQ, and

BDI were run to assess convergent validity with cardiorespiratory symptoms, fear of dying, and symptom confusion entered as the outcome variables. All five measures mentioned above were treated as continuous variables. Relationships between CR symptoms and the PDSS, physical concerns subscale of the ASI-3, BSQ, ASQ, and BDI were explored by means of separate point-biserial correlations. Similarly, point-biserial correlations were employed to explore the relationships between fear of dying during a panic attack and the PDSS, cognitive subscale of the ASI-3, ACQ, and BDI. Point-biserial correlations were also used to assess the relationship between symptom confusion and all five measures.

Specific Aim 1

To examine the relationships between acculturation (nativity, language proficiency, and ethnic identification) and panic severity.

Hypothesis 1a. Greater linguistic acculturation, greater mainstream U.S. ethnic identification, and Mainland U.S. born status would be associated with greater panic severity. Linguistic acculturation was measured by the English proficiency scale (higher scores indicating higher linguistic acculturation) and the Spanish proficiency scale (lower scores indicating higher acculturation). Ethnic identification was measured by the Ethnic Identification Scale (higher scores indicate more identification with mainstream U.S.-oriented ethnicity). Mainland U.S.-born or foreign-born status were self-reported. Panic severity is based on a composite score (established by averaging the scores on the seven assessor-rated items) and treated continuously. This hypothesis was tested using a hierarchical linear regression analysis, with panic severity as the dependent variable and nativity status, Spanish proficiency, English proficiency, and ethnic identification as predictors, as well as two covariates. The following covariates were chosen based on the

literature and significant associations with the PDSS: age, ethnicity. Due to small cell size in a number of ethnic categories, Ethnicity was dichotomized to Other and Puerto Rican; despite collapsing of categories, the *Other* category had a cell size of nine. Predictor and outcome variables were visually inspected with bar graphs, scatterplots, and histograms for distributions and normality. Multicollinearity between predictor variables of aim 1 and 2 was assessed by Spearman's rho and t-tests (Table 7) and inspection of variance inflation factors.

Age and ethnicity were entered into the first step. Order of predictors entered into the model was based on Berry's theoretical model of acculturation, which suggests physical location, language, and ethnic identification changes happen in this order, as well as previous acculturation literature that has used similar statistical models (Berry et al., 1987; Thakur et al., 2019). Nativity status was entered into the second step; English and Spanish proficiency were entered into the third step; finally, ethnic identification was entered into the fourth step.

Specific Aim 2

To examine the relationships between acculturation (language proficiency, ethnic identification, and nativity) and cardiorespiratory symptoms during a panic attack, fear of dying during a panic attack, and symptom confusion between asthma vs. PD symptoms.

Hypothesis 2a. Greater linguistic acculturation, greater mainstream U.S. ethnic identification, and Mainland U.S. born status would be associated with more cardio-respiratory symptoms. CR symptoms are based on five out six symptoms of the cardio-respiratory PD subtype identified by Meuret et al. (2006) and are based on clinician-rated items as part of a larger differential diagnosis measure. This hypothesis was tested using a logistic regression analysis, with CR symptoms as the dependent variable and nativity status, English proficiency, Spanish proficiency, and ethnic identification as predictors. Based on

previous literature, age and ethnicity were entered as covariates in the first step. Nativity status was entered into the second step. English and Spanish proficiency were entered into the third step. Finally, ethnic identification was entered into the fourth step.

Hypothesis 2b. Greater linguistic acculturation, greater mainstream U.S. ethnic identification, and Mainland U.S. born status would be associated with a greater rate of fear of dying during a panic attack. Fear of dying is the only cognitive symptom of the six symptoms of the cardiorespiratory PD subtype identified by Meuret et al. (2006) and is based on a clinician-rated item as part of a larger differential diagnosis measure. This hypothesis was tested using a logistic regression analysis, with fear of dying as the dependent variable and nativity status, English proficiency, Spanish proficiency, and ethnic identification as predictors; two covariates were entered into the first step. Nativity status was entered into the second step. English and Spanish proficiency were entered into the third step. Finally, ethnic identification was entered into the fourth step.

Hypothesis 2c. Greater linguistic acculturation, greater mainstream U.S. ethnic identification, and Mainland U.S. born status would be associated with greater clinician-rated symptom confusion. Symptom confusion between asthma and PD symptoms is based on a clinician-rated item as part of a larger differential diagnosis measure. This hypothesis was tested using a logistic regression analysis, with symptom confusion as the dependent variable and nativity status, Spanish proficiency, English proficiency, and ethnic identification as predictors. Two covariates were entered into the model. Nativity status was entered into the second step. English and Spanish proficiency were entered into the third step. Finally, ethnic identification was entered into the fourth step.

Specific Aim 3

To explore the relationship between acculturative stress, panic severity, symptom confusion between asthma vs. PD symptoms, and pulmonary function (FEV_1/FVC; FEV_1). Separate linear hierarchical linear regressions were conducted to test hypotheses A and C with the respective measure as the dependent variable and acculturative stress as the continuous predictor, as well as two covariates. A logistic regression was conducted to test hypothesis 3b with acculturative stress as the independent predictor and one covariate.

Hypothesis 3a. Greater acculturative stress would be associated with greater panic severity. Acculturative stress, as measured by the Cultural Stress Questionnaire, is a continuous variable, with higher scores indicating higher acculturative stress. Panic severity served as the dependent variable. Two covariates were entered into the first step. Acculturative stress was entered into the second step.

Hypothesis 3b. Greater acculturative stress would be associated with greater clinician-rated symptom confusion. Symptom confusion served as the dependent variable. One covariate was entered into the first step and acculturative stress was entered in the second step.

Hypothesis 3c. Greater acculturative stress would be associated with decreased pulmonary function, measured by FEV_1/FVC and FEV_1. FEV_1/FVC and FEV_1 are objective measures of pulmonary function (NHLBI, 2007) and were treated as the continuous dependent variables in separate hierarchical linear regressions. Two covariates and acculturative stress were entered into the models in the same manner as the previous two hypotheses.

Chapter III: Results

Participant Characteristics

A total of 53 adults who identified as Latino/Hispanic participated in this study. As seen in Table 4, the sample was largely female (94.34%), Puerto Rican (83.02 %), had a yearly household income of $16000 or more (60%), and medically insured (83.02%). The average age was 43.96 (*SD* = 12.82) years old ranging from 19 to 70. Over half of the sample identified racially as White Hispanic (56.60%) and were born in the U.S. (54.72%). The median age at migration for the 24 participants who were not born in the U.S. mainland was 17.50 (IQR = 3.75- 20.75). On average, foreign-born participants had lived 34.79 (*SD* = 12.26) years in the U.S. About half of the participants had never been married (43.39%) and had some college education or a college degree (43.39%).

Table 4. *Participant Baseline Demographic Variables*

Demographics	Total (N =53)
Age, M± SD	43.96 ± 12.82
Gender, N (%) female	50 (94.34)
Race, N (%) [a]	
White Hispanic	30 (58.82)
Black Hispanic	8 (15.69)
Mixed Race	8 (15.69)
Other	5 (9.8)
Ethnicity, N (%)	
Puerto Rican	44 (83.02)
Dominican	5 (9.43)
Other	4 (7.55)
Place of Birth, N (%)	
United States	29 (54.72)
Puerto Rico	18 (33.96)
Other	6 (11.32)
Total Household Income, N (%) [a]	
≥ $16000	20 (40.0)
< $16000	30 (60.0)
Education, N (%)	
Less than High school	16 (30.19)
High School Graduate	14 (26.42)
Some College/College Degree	23 (43.39)
Marital Status N (%)	
Married	12 (24.53)
Never Married	23 (43.40)
Separated/Divorced/Widowed	17 (32.07)
HI Coverage in 12 mo N (%)	44 (83.02)
Years in the U.S, M±SD[b]	37.25 ± 12.24
Age at Migration to U.S., Mdn [IQR]	17.50 [3.75-20.75]

Note: The *Other* category for *Race* included: Black Caribbean/West Indian, American Indian/Alaska Native, Hispanic/Latine. The *Other* category for ethnicity included the following: Mexican, South American. The *Other* category for *Country of Birth* included: Mexico and Dominican Republic.
[a] Some participants chose not to report.
[b] Calculated for those born outside of the U.S. mainland

Linguistic Acculturation

A total of 47 participants completed the English (ELP) and Spanish (SLP) subscales of the LPPQ after identifying speaking both English and Spanish; six participants identified as English-monolingual speakers and did not complete the measure. Participants showed high proficiency in both English (*Mdn* = 3.33, *IRQ* = 2.330-400) and Spanish (*Mdn* = 3.00, *IQR* = 2.00-4.00), suggesting that most were bilingual (Table 5). The data were not normally distributed, with a score of 4 (Excellent Proficiency) being the most frequent response for both the ELP (40.43%; Figure 4) and the SLP subscales (29.8%; Figure 5). Skewness and Kurtosis values were within acceptable range, as seen in Table 5. The reliability for ELP (α = .933) and SLP (α = .912) was assessed by Cronbach's alpha and both measures had good internal consistency reliability.

Table 5. *Descriptive Statistics for the ELP and SLP*

Variable	*N*	Median	*IQR*	Skewness	Kurtosis	Min	Max
ELP	47	3.33	2.33-4.00	-.691	-.579	1.00	4.00
SLP	47	3.00	2.00-4.00	-.133	-1.38	1.33	4.00

Figure 4
Frequency of Total ELP Scores

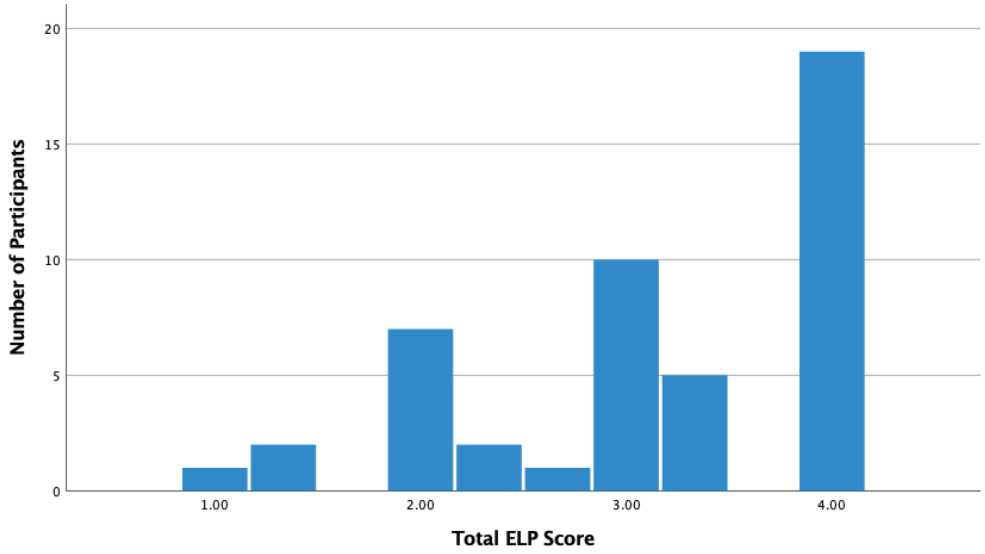
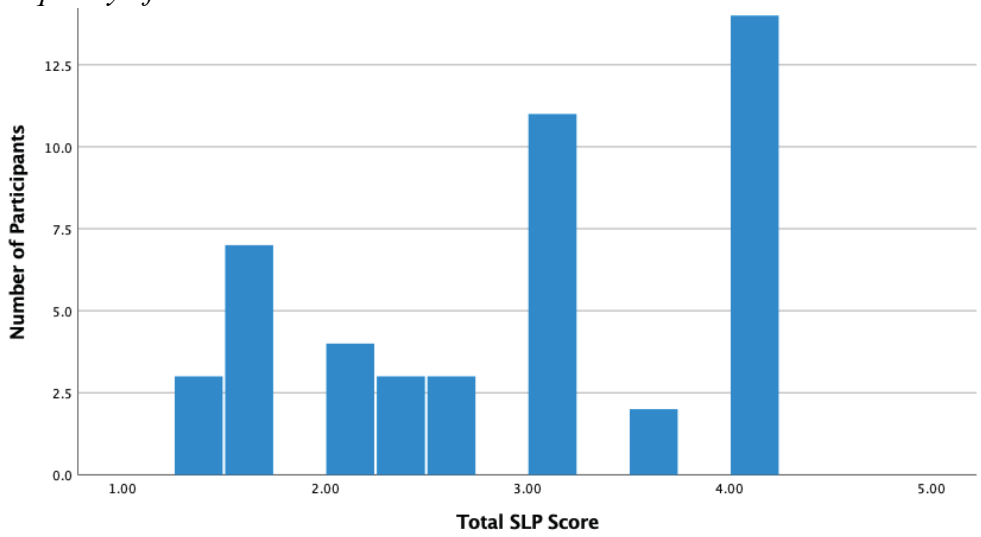


Figure 5
Frequency of Total SLP Scores



Ethnic Identification

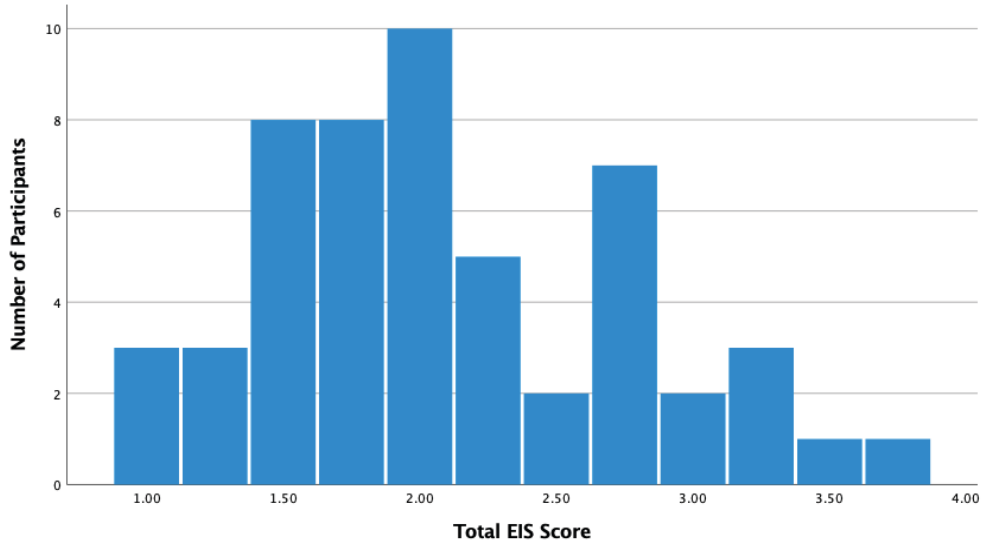
53 participants completed the Ethnic Identity Scale (EIS). Latine ethnic identification was average for the sample (M = 2.1, SD = .671), suggesting neither low nor high identification with Latino or mainstream U.S. ethnicity, perhaps indicating a largely bicultural sample. The data were normally distributed, as seen in Table 6. Please see Figure

6 for the frequency of answers for the EIS. Cronbach's alpha was used to assess the measure's reliability ($\alpha = .679$) and was found to be acceptable.

Table 6. *Descriptive Statistics for the EIS*

Variable	*N*	Mean	SD	Skewness	Kurtosis	Min	Max
EIS	53	2.10	.671	.494	-.386	1.00	3.75

Figure 6
Frequency of Total EIS Scores



The absence of multicollinearity between acculturation proxies was confirmed using Spearman's rho, Mann-Whitney U, and t-tests (Table 7) and inspection of tolerance and variance inflation factors.

Table 7. *Intercorrelations between Acculturation Proxies*

Variable	1	2	3	4
1. English Language Proficiency (ELP)	-	-.18	.39**	$U = 461.00$***
2. Spanish Language Proficiency (SLP)	-	-	-.246	$U = 169.50$*
3. Ethnic Identity Scale (EIS)	-	-	-	$t\ (50.41) = -2.49$*
4. Nativity	-	-	-	-

*$p<.05$
**$p<.01$
***$p<.001$

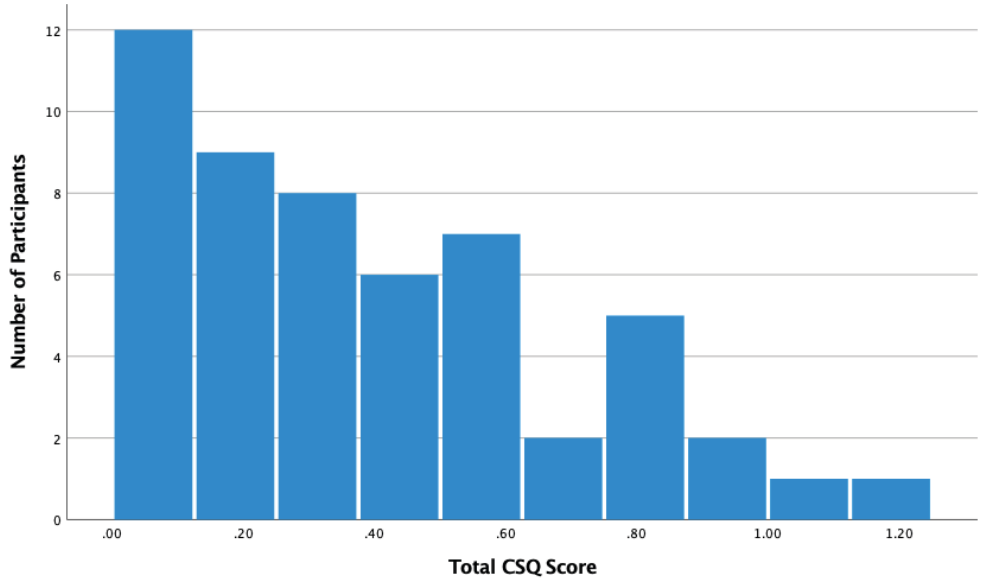
Acculturative Stress

The entirety of the sample ($N = 53$) completed the Cultural Stress Questionnaire (CSQ). The measure was considered to have good reliability ($\alpha = .865$), as assessed by Cronbach's alpha. The data were not normally distributed (Figure 7); skewness and kurtosis variables were acceptable as they fell between $\pm$ 1 (Table 8). Acculturative stress levels in the sample were low (*Mdn* = .318, *IQR* = .139-.608).

Table 8. *Descriptive Statistics for the CSQ*

Variable	*N*	Median	*IQR*	Skewness	Kurtosis	Min	Max
CSQ	53	.318	.139-.608	.732	-.241	0.00	1.20

Figure 7
Frequency of Total CSQ Scores



Panic Severity

All 53 participants had data available for the Panic Disorder Severity Scale (PDSS). Based on anchors of severity (Keough et al., 2012), this sample's total sum of scores suggests the sample was "mildly ill" regarding the severity of panic (M = 16.25, SD = 4.18). The mean composite clinician-rated score on the PDSS was 2.32 (SD = .597), indicating, on average, clinicians rated the sample as "mildly ill." The data were normally distributed, with scores ranging from 1.29-3.71 (Table 9). The measure was found to have acceptable reliability (α =.754).

In analyses to examine associations between demographic and main outcome variables, panic severity was not associated with age (r = -.043, p = .762), race (F(3, 47) =. 992, p = .405), marital status (F(2, 50) = .779, p = .464), income (t (51) = .274, p = .785), level of education (F(2, 50) = .599, p = .553), health insurance coverage (t (50) = -.634, p = .529), age at migration (r_s = -.082, p = .704), or years in the U.S. (r_s = -.088, p = .532). Panic

severity was associated with ethnicity, such that Puerto Rican participants (M = 2.42, SD = .508) had significantly higher panic severity than those participants of other ethnic identities (M = 1.86, SD = .154), t (51) = -2.71, p = .009. Therefore, ethnicity was included as a covariate in the model of analysis of panic severity along with age.

Table 9. *Descriptive Statistics for the PDSS*

Variable	*N*	Mean	SD	Skewness	Kurtosis	Min	Max
PDSS Total Sum Score	53	16.25	4.18	.143	-.513	9.00	26.00
PDSS Total Composite Score	53	2.32	.597	.143	-.513	1.29	3.71

Cardiorespiratory Symptoms During a Panic Attack

Number of CR symptoms data were available for 51 participants. The number of symptoms experienced during a panic attack ranged from one to five. Largely, participants experienced a high number of CR symptoms (*Mdn* = 4.00, *IRQ* = 3.00-5.00; Table 10). Due to the asymmetric distribution, the variable was dichotomized, as some symptoms (41.18%) and most symptoms (58.82%), using a median-split. One to three symptoms were grouped in the first category and four to five in the latter, yielding relatively similar cell sizes.

In examination of associations between CR and demographic categorial variables, Chi square and Fisher's exact tests indicated that there were no associations between CR symptoms and race (χ^2 = 1.36, p = .243), income (χ^2 = 1.06, p = .304), level of education (χ^2 = .072, p = .964), marital status (χ^2 = .859, p = .651), ethnicity (p = .460), or insurance coverage (p = .706). An independent samples t-test revealed there were no significant associations between CR symptoms and years in the U.S. (t (49) = .569, p = .572). Mann-

Whitney U tests revealed that age (U = 306.0, z = -.172, p = .863) and age at migration (U = 38.5, z = -1.57, p = .120) were not significantly different between some or most CR symptoms. Age and ethnicity were entered into the model for CR analyses based on the previous literature.

Table 10. *Descriptive Statistics for Cardiorespiratory Symptoms During a Panic Attack*

Variable	*N*	Median	*IQR*	Skewness	Kurtosis	Min	Max
CR Symptoms	51	4.00	3.00-5.00	-.438	-.897	1.00	5.00

Fear of Dying During a Panic Attack

Data on fear of dying were available for 51 participants. The variable was treated dichotomously. Much of the sample was found to have experienced fear of dying during a panic attack (60.78%). In an examination of the relationships between demographics and fear of dying, independent samples t-test did not reveal significant associations between fear of dying and age (t(49) = -1.71, p = .093) or years in the U.S. (t(49) = -1.06, p = .292). Chi square tests indicated there were no associations between fear of dying and race (χ^2 = 1.21, p = .271), marital status (χ^2 = 2.10, p = .350), education (χ^2 = 1.35, p = .510), or income (χ^2 = .008, p = .927). Fisher's exact tests revealed fear of dying was not associated with insurance coverage (p = 1.00) or ethnicity (p = .289). Although no demographic variables were associated with fear of dying during a panic attack, age and ethnicity were entered into the model for fear of dying analyses.

Symptom Confusion Between Asthma and Panic

Data on confusion between asthma and panic symptoms were available for 51 participants. Visual inspection of the distribution suggests normality (Figure 11), and skewness and kurtosis values are within the acceptable range (Table 11), although a Shapiro-Wilk test of normality suggested a non-normal distribution ($p<.001$). As such, the variable was dichotomized into "always/often" and "sometimes/rarely" distinguishing between asthma and panic symptoms. Confusion was low in this sample (31.4%), suggesting that participants were largely able to distinguish between asthma and panic symptoms. Analyses of associations between symptom confusion and demographic variables revealed that neither age ($t(49)=-.419$, $p=.677$), years in the U.S ($t(49)=-.369$, $p=.719$), age at migration ($U = 54.0$, $z = -.351$, $p = .725$), race ($\chi^2 = .072$, $p = .788$), marital status ($\chi^2 = .772$, $p = .379$), education ($\chi^2 = 1.81$, $p = .179$), nor income ($\chi^2 = 621$, $p = .431$) were associated with symptom confusion. Similarly, results from Fisher's exact tests indicate that ethnicity ($p=.242$) and insurance coverage ($p=1.00$) were not associated with confusion between asthma and panic symptoms. Age and ethnicity were entered into the main analysis.

Table 11. *Descriptive Statistics for Symptom Confusion Between Asthma and Panic*

Variable	*N*	Median	*IQR*	Skewness	Kurtosis	Min	Max
Symptom Confusion	51	2.00	2.00-3.00	.415	-.335	1.00	4.00

Pulmonary Function

FEV_1/FVC data were available for the entire sample ($N = 53$). Data from one participant was omitted from analyses due to an extreme value ($n = 52$). After removal of the outlier, the data appeared normally distributed, and skewness and kurtosis were acceptable

(Table 12). The mean FEV_1/FVC ($M = 94.6$, $SD = 10.83$) indicates normal pulmonary function on the day of testing.

Associations between FEV_1/FVC and demographic variables were examined. Person's correlation analyses yielded no significant relationship between FEV_1/FVC and age ($r = .268$, $p = .055$) or years in the U.S. ($r = .173$, $p = .219$), yet a positive trend is of note between FEV_1/FVC and age. A series of separate independent-samples t-tests were run between FEV_1/FVC and race, ethnicity, income, and health insurance. One outlier was removed from analyses with race and health insurance, and two outliers were removed from the analysis with ethnicity. Results did not reveal a significant mean difference of FEV_1/FVC scores between different groups of ethnicity ($t(48) = -1.09$, $p = .282$), income ($t(48) = -1.84$, $p = .072$), health insurance ($t(48) = -1.78$, $p = .082$), or race ($t(47) = -2.00$, $p = .052$). A Kruskal-Wallis H test was run to determine if there were differences in FEV_1/FVC scores between three levels of education due to a non-normal distribution for one of the groups. The mean ranks of FEV_1/FVC scores were not statistically significantly different between groups, $\chi^2(2) = .558$, $p = .756$. Results from a one-way ANOVA indicated there were no statistically significant differences in FEV_1/FVC scores between different marital statuses, $F(2, 49) = .330$, $p = .720$. Although not significantly associated with FEV_1/FVC, age and race were included as covariates due to trends and the established literature.

The FEV_1 percent predicted ($M = 70.68$; $SD = 17.0$) for the sample indicated asthma in the sample was not well controlled on average. Complete results can be found in Table 12. Results from the Shapiro Wilk's test of normality suggested the data were normally distributed ($p = .106$), and skewness and kurtosis variables were within the acceptable range.

Analyses examining associations between %FEV_1 Predicted and demographic variables reveled one significant association. There was a significant difference in FEV_1 scores between income groups ($t(49) = -2.62$, $p = .012$), such that those with an income of $16,000 or greater had higher FEV_1 scores (M=75.9, SE=3.55) than those who made less than $16,000 per year ($M$=65.6, SE=2.61). Results from Pearson's correlations indicated FEV_1 was not associated with age ($r = -.260$, $p = .06$) or years in the U.S. ($r = -.188$, $p = .178$). There were no significant differences in FEV_1 between ethnicity groups ($U = 201$, $z = .071$), $p = .954$, racial groups, ($t(49) = -.698$, $p = .461$), or health insurance coverage ($U = 196.5$, $z = .520$, $p = .603$). After one outlier was removed to normalize the distribution of the high school level of education, results from a one-way ANOVA suggest FEV_1 did not differ significantly among levels of education, $F(2, 49) = 2.91$, $p = .064$. Results from a Kruskal-Wallis H did not yield significant difference in the distributions of FEV_1 across marital statuses, $H(2) = 1.56$, $p = .459$. No association was found between FEV_1 and age of migration, $r_s = -.113$, $p = .424$. Age and income were covariates in the main analysis.

Table 12. *Descriptive Statistics for Pulmonary Function*

Variable	*N*	Mean	SD	Skewness	Kurtosis	Min	Max
FEV_1/FVC	52	94.6	10.8	-.454	-.167	68.0	118.0
FEV_1 Predicted	53	70.7	17.0	-.550	-.293	27.0	101.0

Secondary Measures

Validation analyses were run for CR, fear or dying, and symptoms confusion because the clinician-rated differential diagnosis worksheets from which these variables derive has not been previously validated. Data for the entire sample were available across all measures used for validation purposes. Descriptive statistics and Cronbach's alphas for all

secondary measures can be found in Table 13. Correlation analyses were performed to determine concurrent validity of the CR symptoms, fear of dying, and symptom confusion measures. Separate point-biserial correlations were performed between CR symptoms and the three normally distributed measures (PDSS, ACQ, and BDI). Results from the analysis between CR symptoms and the PDSS suggests moderate convergent validity, r_{pb} = .475, p < .01. A correlation analysis between CR symptoms and the ASQ indicated weak yet significant convergent validity, r_{pb} = .297, p = .034. CR symptoms were not correlated with the BDI, r_{pb} = .197, p = .166. Results from Kendall's tau-b correlations suggested weak concurrent validity between CR symptoms and the BSQ, τ_b = .297, p = .023. CR symptoms and the ASI-physical were not significantly correlated, τ_b = .114, p = .341.

A point-biserial correlations was run between fear of dying and the ACQ, and suggested weak concurrent validity, r_{pb} = .306, p =.03. Fear of dying was not correlated with the PDSS, r_{pb} = .256, p =.07, or the BDI, r_{pb} = .198, p =.163. Kendall's tau-b correlations indicated fear of dying and the ASI-cognitive were not significantly correlated, τ_b = .175, p = .139.

Kendall's tau-b correlations for symptom confusion and total scores of all measures used for validation purposes (PDSS, ASI-physical, ASI-cognitive, BSQ, ACQ, and BDI) were conducted to explore concurrent validity due to a lack of monotonic relationships between symptom confusion and each of the six measures. Symptom confusion between asthma and panic symptoms was not significantly correlated with the PDSS (τ_b = .067, p = .552), ASI-physical (τ_b = -.115, p = .305), ASI-cognitive (τ_b = .036, p = .746), BSQ (τ_b = .033, p = .760), ACQ (τ_b = .032, p = .773), or BDI (τ_b = .134, p = .222).

Table 13. *Descriptive Statistics for Secondary Measures*

Variable	*N*	Mean, Median	SD, IQR	Skewness	Kurtosis	Min	Max	α
ASI-physical	53	18.0	12.5-22.5	-.647	-.558	4.00	24.0	.810
ASI-cognitive	53	15.0	7.00-20.0	-.351	-1.12	.000	24.0	.882
BSQ	53	3.00	2.41-3.82	.168	-1.12	1.65	4.88	.912
ACQ	53	2.59	.829	.185	-.703	1.14	4.29	.851
BDI	53	25.06	13.44	.377	-.663	5.00	56.00	.926

Analyses by Aim

Specific Aim 1

Associations between acculturation (Language proficiency, ethnic identity, and nativity) and panic severity were examined.

Unadjusted Hypothesis 1. A hierarchical linear regression was used to test the association between acculturation proxies and panic severity. Nativity was entered into the first step of the model and explained 0.6% of the variance (R^2_{change}= .006, F_{change}[1, 45] = .256, p = .616; Table 14). English and Spanish language proficiency were added in the second step and did not contribute significantly to the change in variance of the model (R^2_{change} = .035, F_{change} [2, 43] = .781, p = .464). Ethnic identification, entered into the third step, explained a significant change in variance of 12.6% (R^2_{change} = .126, F_{change}=6.36, p = .016), such that more identification with mainstream U.S. identity was associated with more severe panic (β = .395, *SE* = .144). The full model explained 16.7% of the variance and was not significantly associated with panic severity, F [4, 42] = 2.10, p = .098.

Table 14. *Unadjusted Linear Regression Analysis for Association between Acculturation Proxies and Panic Severity*

						Coefficient	
Step	Variable	*B*	*SEB*	β	*t*	R^2 change	*P*
1						.006	.616
	Nativity	-.092	.183	-.075	-.506	.006	.616
2						.035	.464
	English LP	-.116	.133	-.166	-.876		.386
	Spanish LP	-.101	.105	-.153	-.959		.343
3[a]						.126	.016
	Ethnic Identity	.362	.144	.395	2.52		.016

[a] $F_{\text{change}}(1, 42) = 6.36$, $p = .016$

Adjusted Hypothesis 1. In previous analyses, age, and ethnicity were found to be associated with panic severity. As such, these were entered as covariates into the first step of the regression for panic severity and contributed significantly to the variance of the model, $F_{change}(2, 44) = 3.96$, $p = .026$. Ethnicity but not age was associated with panic severity, in that the Puerto Rican ethnicity was associated with greater panic severity. Nativity (Step 2) did not explain a significant portion of the change in variance (5%) in panic severity, $F_{change}(1, 43) = 2.68$, $p = .109$. Similarly, English and Spanish language proficiency (Step 3) did not contribute significantly to the change in variance of the model (2.4%), $F_{change}(2, 41) = .635$, $p = .534$. This adjusted analysis showed that ethnic identification (Step 4) significantly explained 13% of the variance ($F_{change}(1, 40) = 8.06$, $p = .007$) such that more identification with mainstream U.S. identity was associated with more severe panic ($\beta = .426$, $SE = .138$;

Table 15). The full model explained 35.6 % of the variance, F (6, 40) = 3.69, p = .005. The hypothesis was partially supported.

Table 15. *Adjusted Linear Regression Analysis for Association between Acculturation Proxies and Panic Severity*

							Coefficient	
Step	Variable	*B*	*SEB*	β	*t*	*F*	R^2 change	*p*
1							.152	.026
	Age	-.009	.008	-.161	-1.07			.290
	Ethnicity	.661	.235	.424	2.81	3.96		.007
2							.050	.109
	Nativity	-.307	.187	.187	-1.64	3.63		.109
3							.024	.535
	English LP	-.139	.123	.123	-1.12			.268
	Spanish LP	.002	.102	.102	.018	2.40		.986
4[a]							.130	.007
	Ethnic Identity	.390	.138	.138	2.84	3.68		.007

[a] F_{change} (1, 40) = 8.06, p = .007

Specific Aim 2

Associations between acculturation (nativity, language proficiency, and ethnic identity) and cardiorespiratory symptoms, fear of dying, and confusion between asthma and panic symptoms were examined.

Unadjusted Hypothesis 2a. In the unadjusted analyses, the dichotomous predictor nativity was entered in the first step of the regression**,** English and Spanish proficiency into the second, and ethnic identification into the third. The Omnibus tests of model coefficients revealed that none of the three steps were significant (χ^2=2.21, p=.137; χ^2=3.72, p=.294; χ^2=3.90, p=.420). The Nagelkerke statistic revealed that 6.3% of the variance in CR symptoms was explained by nativity (step 1). The addition of English and Spanish

proficiency (step 2) explained a change in variance of 4.1%. Lastly, ethnic identification (step 3) contributed a .5% change in the variance of the model. CR symptoms was not associated with nativity, English proficiency, Spanish proficiency, or ethnic identification (Table 16); acculturation was not associated with cardiorespiratory symptoms. The hypothesis was not supported by unadjusted analyses.

Table 16. *Unadjusted Analysis for Associations between CR symptoms and Acculturation Proxies: Nativity, Language Proficiency, and Ethnic Identification*

		Coefficient								
Step	Variable	*B*	*SE*	Wald	df	Nagelkerke R^2	Odds-Ratio	95% CI Lower	95% CI Upper	*p*
1						.063				
	Nativity	.368	.783	.221	1		1.45	.312	6.70	.638
2						.104				
	English Proficiency	-.584	.472	1.54	1		.557	.221	1.41	.215
	Spanish Proficiency	.078	.361	.046	1		1.08	.533	2.20	.828
3						.109				
	Ethnic Identification	.219	.512	.184	1		1.25	.457	3.40	.668

Adjusted Hypothesis 2a. In the adjusted analyses, age and ethnicity were entered in the first step of the regression as covariates based on previous literature. The dichotomous predictor nativity was entered in the second step of the regression**,** English and Spanish proficiency into the third, and ethnic identification into the fourth. The Omnibus test of model coefficients revealed that step 1 was not significant (χ^2=.464, *p*=.793). Similarly, neither step 1, step 2, or step 3 were significant (χ^2=3.95, *p*=.267; χ^2=6.31, *p*=.227; χ^2=6.39, *p*=.381). The Nagelkerke statistic revealed that 1.3% of the variance in CR symptoms was explained by age and ethnicity (step 1). The addition of nativity (step 2) explained a change

in variance of 9.7%. English and Spanish proficiency (step 3) explained a 6.1% of change in variance. Lastly, ethnic identification (step 4) contributed a .2% change in the variance of the model. CR symptoms was not associated with nativity, English proficiency, Spanish proficiency, or ethnic identification; acculturation was not associated with cardiorespiratory symptoms after controlling for the effects of age and ethnicity. The hypothesis was not supported.

Table 17. *Adjusted Analysis for Associations between CR symptoms and Acculturation Proxies: Nativity, Language Proficiency, and Ethnic Identification*

		Coefficient								
Step	Variable	*B*	*SE*	Wald	df	Nagelkerke R^2	Odds-Ratio	95% CI Lower	95% CI Upper	*p*
1						.013				
	Age	-.037	.034	1.178	1		.964	.902	1.03	.278
	Ethnicity	-1.52	1.05	2.08	1		.219	.028	1.73	.150
2						.110				
	Nativity	.651	.823	.626	1		1.92	.382	9.62	.429
3						.171				
	English Proficiency	-.643	.483	1.77	1		.525	.204	1.36	.183
	Spanish Proficiency	.285	.403	.501	1		1.33	.604	2.93	.479
4						.173				
	Ethnic Identification	.154	.549	.078	1		1.17	.397	3.42	.780

Unadjusted Hypothesis 2b. A logistic regression was used to test a model investigating the relationship between fear of dying and acculturation. Nativity was entered in the first step of the regression**,** English and Spanish proficiency into the second, and ethnic identification into the third. The Omnibus tests of model coefficients revealed that none of the three steps were significant (χ^2=.336, *p*=.545; χ^2=.391, *p*=.942; χ^2=2.55, *p*=.636). The

Nagelkerke statistic indicated that nativity (step 1) explained 1.1% of the variance in fear of dying. English and Spanish proficiency, added in step 2, did not explain any change in variance (0%). Ethnic identification (step 3) contributed a 6.2% change in the variance of the model. Fear of dying was not associated with nativity, English proficiency, Spanish proficiency, or ethnic identification; acculturation was not associated with fear of dying. The hypothesis was not supported by unadjusted analyses.

Table 18. *Unadjusted Analysis for Associations between Fear of Dying and Acculturation Proxies*

		Coefficient								
Step	Variable	*B*	*SE*	Wald	df	Nagelkerke R^2	Odds-Ratio	95% CI Lower	95% CI Upper	*p*
1						.011				
	Nativity	.366	.607	.364	1		1.44	.439	4.74	.546
2						.011				
	English Proficiency	.409	.440	.012	1		1.05	.443	2.48	.911
	Spanish Proficiency	-.038	.356	.011	1		.963	.479	1.94	.916
3						.073				
	Ethnic Identification	.763	.538	2.01	1		2.14	.747	6.16	.157

Adjusted Hypothesis 2b. Based on previous literature, age and ethnicity were entered as covariates into the first step of the regression model. The Omnibus tests of model coefficients revealed that the overall model was not significant at any of the four steps (χ^2=2.49, *p*=.288; χ^2=2.64, *p*=.451; χ^2=2.77, *p*=.736; χ^2=7.43, *p*=.283). The Nagelkerke statistic revealed that 7.1% of the variance in fear of dying was explained by age and ethnicity added in the first step 1. The addition of nativity in the second step explained a change in variance of 0.5%. In step three, English and Spanish proficiency contributed a .3%

change in the variance of the model. Ethnic identification, entered in the fourth step, explained a 12.3% change in variance. Fear of dying was not associated with nativity, English proficiency, or Spanish proficiency. Ethnic identification was associated with fear of dying (*OR*=3.63, 95% *CI* [1.02, 12.97], *p*=.047); Table 19) when controlling for age and ethnicity; such that higher identification with mainstream U.S identity was associated with an increased likelihood of experiencing fear of dying during a panic attack. The hypothesis was partially supported by adjusted analyses.

Table 19. *Adjusted Analysis for Associations between Fear of Dying and Acculturation Proxies: Nativity, Language Proficiency, and Ethnic Identification*

		Coefficient								
Step	Variable	*B*	*SE*	Wald	df	Nagelkerke R^2	Odds-Ratio	95% CI Lower	95% CI Upper	*p*
1						.071				
	Age	.032	.029	1.21	1		1.03	.975	1.09	.270
	Ethnicity	-.485	.828	.344	1		.616	.122	3.12	.558
2						.076				
	Nativity	.269	.698	.149	1		1.31	.333	5.14	.700
3						.079				
	English Proficiency	.139	.838	.186	1		1.15	.470	2.81	.761
	Spanish Proficiency	.085	.395	.047	1		1.09	.503	2.36	.829
4						.202				
	Ethnic Identification	1.29	.650	3.94	1		3.63	1.02	12.97	.047

Unadjusted Hypothesis 2c. In the unadjusted analyses, nativity was entered in the first step of the regression**,** English and Spanish proficiency into the second, and ethnic identification into the third. The Omnibus tests of model coefficients revealed that none of the three steps were significant (χ^2=.107, *p*=.743; χ^2=.328, *p*=.955; χ^2=3.90, *p*=.420). The

Nagelkerke statistic revealed that .3% of the variance in symptom confusion was explained by nativity (step 1). The addition of English and Spanish proficiency (step 2) explained a change in variance of 0.7%. Ethnic identification, entered into the last step, did not contribute to a change in the variance (0%). Symptom confusion was not associated with nativity, English proficiency, Spanish proficiency, or ethnic identification (Table 20); acculturation was not associated with symptom confusion in the unadjusted analysis.

Table 20. *Unadjusted Analysis for Associations between Confusion Between Asthma and Panic Symptoms and Acculturation Proxies*

		Coefficient								
Step	Variable	*B*	*SE*	Wald	df	Nagelkerke R^2	Odds-Ratio	95% CI Lower	95% CI Upper	*p*
1						.003				
	Nativity	-.215	.656	.107	1		.807	.223	2.92	.744
2						.010				
	English Proficiency	-.194	.484	.161	1		.824	.320	2.12	.688
	Spanish Proficiency	-.107	.387	.077	1		.898	.421	1.92	.718
3						.010				
	Ethnic Identification	.021	.540	.001	1		1.02	.354	2.94	.969

Adjusted Hypothesis 2c. Age and ethnicity were entered in the first step of the regression as covariates based on previous literature. The predictors were entered in the following order: nativity (step 2), English and Spanish proficiency (step 3), ethnic identification (step 4). The Omnibus test of model coefficients revealed that none of the steps were significant (χ^2=1.88, *p*=.391; χ^2=1.89, *p*=.596; χ^2=2.07, *p*=.840; χ^2=2.13, *p*=.908). The Nagelkerke statistic revealed that 5.8% of the variance in symptom confusion was explained by age and ethnicity (step 1). The addition of nativity (step 2) did not explain a change in

variance (0%). English and Spanish proficiency (step 3) explained a 0.5% of change in variance. Lastly, ethnic identification (step 4) contributed a 0.2% change in the variance of the model. Symptom confusion was not associated with nativity, English proficiency, Spanish proficiency, or ethnic identification (Table 21) after controlling for age and ethnicity. The hypothesis was not supported.

Table 21. *Adjusted Analysis for Associations between Symptom Confusion and Acculturation Proxies: Nativity, Language Proficiency, and Ethnic Identification*

		Coefficient								
Step	Variable	*B*	*SE*	Wald	df	Nagelkerke R^2	Odds-Ratio	95% CI Lower	95% CI Upper	*p*
1						.058				
	Age	-.003	.032	.009	1		.997	.937	1.06	.924
	Ethnicity	-1.38	1.18	1.37	1		.251	.025	2.54	.242
2						.058				
	Nativity	-.066	.747	.008	1		.936	.217	4.04	.929
3						.063				
	English Proficiency	-.200	.520	.147	1		.819	.296	2.27	.701
	Spanish Proficiency	.058	.409	.020	1		1.06	.475	2.36	.888
4						.065				
	Ethnic Identification	.144	.538	.061	1		1.15	.371	3.60	.804

Specific Aim 3

Unadjusted Hypothesis 3a: A linear regression was used to investigate the relationship between acculturative stress and panic severity. In the unadjusted analyses, acculturative stress was entered in the first step of the regression**.** Model 1 explained 9.5% of the variance ($R^2_{\text{change}} = .095$, F_{change} [1, 51] = 5.34, $p = .025$). Acculturative stress was associated with panic severity (($\beta = .308$, $SE = .258$; Table 22), such that a greater level of

acculturative stress was associated with more severe panic. The hypothesis was supported by the unadjusted analyses.

Table 22. *Unadjusted Linear Regression Analysis for Association between Acculturative Stress and Panic Severity*

							Coefficient	
Step	Variable	*B*	*SEB*	β	*t*	*F*	R^2 change	*p*
1							.095	.025
	Acculturative Stress	.597	.258	.308	2.31	5.34		

Adjusted Hypothesis 3a: Age and ethnicity were entered into the first step of the model and explained 14.9% of the variance of the model (R^2 = .149, F [2, 50] = 4.38, p = .018). Acculturative stress explained an additional 4.9% of the variance (R^2_{change} = .049, F_{change} [1, 49] = 3.02, p = .089). Acculturative stress was not associated with panic severity (β = .230, *SE* =.257; Table 23) when controlling for age and ethnicity. The hypothesis was not supported by the adjusted analyses.

Table 23. *Adjusted Linear Regression Analysis for Association between Acculturative Stress and Panic Severity*

							Coefficient	
Step	Variable	*B*	*SEB*	β	*t*	*F*	R^2 change	*p*
1						4.38	.149	.018
	Age	-.007	.006	-.160	-1.17			.290
	Ethnicity	.632	.215	.401	2.94			.005
2						4.04	.049	.089
	Acculturative Stress	-.447	.257	.230	1.74			.089

Unadjusted Hypothesis 3b: A logistic regression was used to investigate the relationship between acculturative stress (step1) and symptom confusion. The Omnibus test of model coefficients revealed that the model was not significant (χ^2=3.38, p=.066). The

Nagelkerke statistic revealed that 9% of the variance in symptom confusion was explained by acculturative stress (step 1; Table 24). Symptom confusion was not associated with acculturative stress; therefore, the hypothesis was not supported by the unadjusted analysis.

Table 24. *Unadjusted Analysis for Associations between Confusion Between Asthma and Panic Symptoms and Acculturative Stress*

		Coefficient								
Step	Variable	*B*	*SE*	Wald	df	Nagelkerke R^2	Odds-Ratio	95% CI Lower	95% CI Upper	*p*
1						.090				
	Acculturative Stress	-2.11	1.23	2.94	1		.121	.011	1.35	.086

Adjusted Hypothesis 3b. Age was entered in the first step of the regression as covariate. Acculturative stress was entered into the second step. Data from one participant had a standardized residual above 2.5 and thus, was excluded from analyses. The Omnibus test of model coefficients revealed that the first step was not significant (χ^2=.203, *p*=.654). The Nagelkerke statistic revealed that .6% of the variance in symptom confusion was explained by age (step 1). Similarly, the Omnibus test of model coefficients revealed that step two, as a whole, was not significant (χ^2=5.60, *p*=.061). However, the addition of acculturative stress, in step two, significantly explained an additional 14.4% of variance. Therefore, acculturative stress was associated with confusion between asthma and panic symptoms (*OR*=.049, 95% *CI* [.003, .856], *p*=.039; Table 25) after controlling for age, although not as we hypothesized. Greater acculturative stress was associated with a greater ability to distinguish between asthma and panic symptoms.

Table 25. *Adjusted Analysis for Associations between Symptom Confusion and Acculturative Stress*

		Coefficient								
Step	Variable	*B*	*SE*	Wald	df	Nagelkerke R^2	Odds-Ratio	95% CI Lower	95% CI Upper	*p*
1						.006				.654
	Age	.011	.024	.201	1		1.01	.965	1.06	.654
2						.150				.061
	Acculturative Stress	-3.01	1.46	4.27	1		.049	.003	.856	.039

Unadjusted Hypothesis 3c. Two separate linear regressions were used to test the association between acculturative stress and FEV_1/FVC and FEV_1, respectively. In the first regression, FEV_1/FVC was entered as the dependent variable. One participant with a standardized residual much smaller than three standard deviations was removed from analyses. Acculturative stress was entered into the first step of the model and explained 11.2% of the variance (R^2_{change} = .112, $F_{change}[1, 50] = 6.32$, p = .015; Table 26), such that more acculturative stress was associated with lower FEV_1/FVC (β = -.335, SE = 4.65).

In the second regression, % FEV_1 Predicted was entered as the dependent variable. Acculturative stress was entered into the first step of the model and explained 5.3% of the variance (R^2_{change} = .053, $F_{change}[1, 50] = 2.78$, p = .102; Table 27). Acculturative stress was not associated with FEV_1 (β = -.229, SE = 7.18). Our hypothesis was partially supported by the unadjusted analyses, such that more acculturative stress was associated with lower FEV_1/FVC but not with FEV_1.

Table 26. *Unadjusted Linear Regression Analysis for Association between Acculturative Stress and FEV_1/FVC*

						Coefficient	
Step	Variable	*B*	*SEB*	β	*t*	R^2 change	*p*
1	Acculturative Stress	-11.7	4.65	-.335	-2.51	.112	.015

Table 27. *Unadjusted Linear Regression Analysis for Association between Acculturative Stress and FEV_1*

						Coefficient	
Step	Variable	*B*	*SEB*	β	*t*	R^2 change	*p*
1	Acculturative Stress	-11.95	7.18	-.229	-1.67	.053	.102

Adjusted Hypothesis 3c. Age and race were entered as covariates into the first step of the regression to control for their effect on FEV_1/FVC. As in the unadjusted analyses, one participant with a standardized residual below three standard deviations was removed. Acculturative Stress (Step 2) explained a significant portion of the change in variance (9.5%) in FEV_1/FVC, (F_{change} (1, 46) = 5.52, p = .023), independent of age and race (Step 1), such that more acculturative stress was associated with lower FEV_1/FVC (β = -.311, *SE* = 4.67; Table 28). The full model explained 20.8 % of the variance, F (3, 46) = 4.03, p = .013.

Age and income were entered as covariates into the first step of the regression to control for their effect on FEV_1. Acculturative Stress (Step 2) did not explain a significant portion of the change in variance (5%) in FEV_1, (F_{change} (1, 48) = 3.07, p = .086; Table 29). The full model explained 21.8 % of the variance, F (3, 48) = 4.47, p = .008. In the adjusted analyses, our hypothesis was partially supported, such that more acculturative stress was associated with lower FEV_1/FVC but not with FEV_1.

Table 28. *Adjusted Linear Regression Analysis for Association between Acculturative Stress and FEV_1/FVC*

		Coefficient						
Step	Variable	*B*	*SEB*	β	*t*	*F*	R^2 change	*p*
1						3.00	.113	.060
	Age	.201	.119	.236	1.69			.098
	Race	4.49	3.12	.201	1.44			.156
2						4.03	.095	.023
	Acculturative Stress	-10.96	4.67	-.311	-2.35			.023

Table 29. *Adjusted Linear Regression Analysis for Association between Acculturative Stress and FEV_1*

		Coefficient						
Step	Variable	*B*	*SEB*	β	*t*	*F*	R^2 change	*p*
1						4.96	.168	.011
	Age	-.275	.164	-.219	-1.68			.100
	Income	11.5	4.25	.353	2.71			.009
2						4.57	.050	.086
	Acculturative Stress	-11.8	6.72	-.226	-1.75			.086

Chapter IV: Discussion

Summary of Findings

This study aimed to investigate the associations between acculturation, acculturative stress, and panic and asthma outcomes. Several hypotheses were partially supported. Clinician-rated panic severity were associated with ethnic identification but not linguistic acculturation or nativity, such that ethnic identification with U.S. mainstream identity was associated with greater panic severity. Similarly, U.S. mainstream identification, but not nativity or linguistic acculturation, was associated with fear of dying during an asthma attack in the adjusted analyses. Greater identification with U.S. mainstream identity was associated with a greater likelihood of experiencing fear of dying during a panic attack when age and ethnicity were controlled for. Additionally, acculturative stress was found to be associated with PDSS scores in unadjusted analyses, such that greater stress was associated with greater panic severity. However, the finding was not sustained in the adjusted analysis. Confusion between asthma and panic symptoms was associated with acculturative stress in the adjusted analysis, but not as we hypothesized. Instead, greater acculturative stress was associated with an ability to largely distinguish between asthma and panic symptoms after controlling for age. The hypothesis (3c) regarding acculturative stress' association with pulmonary function was partially supported. Greater acculturative stress was found to be associated with lower FEV_1/FVC in both the unadjusted and adjusted analyses.

Covariate analyses indicated significant associations between ethnicity and panic severity and income and FEV_1 percent predicted. Thus, participants who identified as Puerto

Rican reported greater panic severity. And those who reported an annual household income of $16,000 or greater had objectively better pulmonary functioning (assessed by %FEV_1 Predicted scores) on the day of testing than those who reported an annual household income of less than $16,000.

Several non-significant findings were also revealed. None of the three acculturation proxies were found to be associated with cardiorespiratory symptoms during an asthma attack or confusion between asthma and panic symptoms in unadjusted or adjusted analyses. Additionally, neither nativity nor linguistic acculturation were associated with panic severity or fear of dying. No significant association was found between acculturative stress and FEV_1 percent predicted. Additionally, analyses investigating the relationships between main outcome variables and demographic variables indicated that cardiorespiratory symptoms, fear of dying, symptom confusion, and FEV_1/FVC were not associated with any demographic variables.

Interpretations

Acculturation and Panic

Greater acculturation via greater ethnic identification with U.S. mainstream culture, as opposed to Latine culture, was associated with greater clinician-rated panic severity in Latine adults with comorbid asthma and panic. The sample had a mean panic severity rating of 2.32 ranging from 1.29 to 3.71, suggesting a "mildly ill" sample. Our findings echo the previous literature, which suggests that higher levels of acculturation are associated with worse psychological distress (Burnett-Zeigler et al., 2013). Furthermore, the relationship between identity acculturation (defined in the present study as identification with mainstream U.S. culture) and panic severity suggests increased severity of symptomatology for those

who are more acculturated. Although no previous research has studied the relationship between ethnic identity and panic severity, literature investigating depression seems to also suggest that greater U.S. mainstream identity is associated with greater symptom severity (Torres, 2010).

The Hispanic Health Paradox denotes that recently immigrated Latine have better health outcomes than U.S born or Latine who have resided in the U.S. longer. Previous literature has hypothesized that the reduction of positive health outcomes observed in more acculturated Latine may be associated with an erosion of protective cultural factors (Abraido-Lanza et al., 2016). Our results seem to support previous findings. Social Identity Theory proposes that ethnic identity can be protective for minoritized groups by way of promoting a sense of belonging and access to group resources that buffer deleterious factors related to minoritized status (Ai et al., 2014). Protective factors for Latine mental health such as social support and *familismo* have been documented in the literature (Falavarjani et al., 2019; Finch & Vega, 2003). Familismo and greater social support have been found to have indirect and direct effects on better mental health, especially for Latinas (Campos et al., 2014; Revens et al., 2021). Greater identification with Latine culture may afford individuals access to greater social and family supports, which may protect against increasing panic severity, whereas those who identify more with mainstream U.S. culture may align more with individualistic values and have less access to the protective factors associated with the collectivistic Latine culture. Future research should aim to investigate direct and indirect effects of ethnic identity acculturation on panic severity with consideration for protective cultural factors, given that loss protective factors that comes with greater acculturation may be related to increased panic severity in Latines with asthma and PD.

It is important to consider the role that acculturation may play on health care utilization and symptom reporting. Brunett-Zigler and colleagues found that more identity acculturated Latines had increased odds of psychiatric service utilization, whereas stronger identification with Latine culture was associated with decreased odds of utilization (Burnett-Zeigler et al., 2018). Increased utilization may translate to increased treatment seeking and symptom and severity reporting for more ethnically acculturated groups but not for those with greater enculturation. The larger RCT that this study derives from provided treatment for participants with asthma-PD; as such, self-selection bias may have resulted in a sample with higher treatment seeking and higher identity acculturation. This may explain why other proxies of acculturation such as nativity and language proficiency were not associated with panic severity.

Acculturation and Fear of Dying

Greater acculturation was associated with greater likelihood of experiencing fear of dying during a panic attack in adjusted analyses. This is what we might expect in the context of the aforementioned finding between mainstream U.S. culture identification and panic severity. This finding revealed a relationship between fear of dying and U.S. identity in the same direction as that of U.S. identity and panic severity. It is fair to reason that fear of dying during a panic attack may be related to increased panic severity in those who have higher identity acculturation.

The lack of significant findings between proxies of acculturation and CR symptoms during a panic attack suggest cognitive processes may have more salient influence in this samples' panic severity. Identity acculturation was associated with both fear of dying during a panic attack (a cognitive symptom) and panic severity. Perhaps cognitive symptoms during

panic attacks as opposed to somatic symptoms are a driving factor behind more severe panic for more identity acculturated Latines. In a study aimed at investigating panic disorder subtypes in a Dutch sample, researchers found a three-factor solution suggesting three panic subtypes. Similar to the findings of Meuret et al. (2006) researchers identified a subtype characterized by cognitive symptoms; unlike Meuret's results, fear of dying loaded on the largely cognitive subtype ("cognitive-autonomic") and not with cardiorespiratory symptoms (Pattyn et al., 2015). Furthermore, the study found that the cognitive-autonomic subtype was associated with severe panic compared to the other two subtypes and higher anxiety sensitivity. Although Meuret's (2006) research suggests that fear of dying belongs to the cardiorespiratory symptom subtype of panic disorder, the relationship between identity acculturation and fear of dying aligns more closely with the findings of Pattyn et al. (2015). Thus, perhaps cognitive symptoms, such as fear of dying, are more relevant in the experience of panic severity for mainstream U.S. identifying Latines with asthma-PD. Future research should aim to study the relationship between identity acculturation, fear of dying, other cognitive symptoms of panic, and panic severity, investigating direct and indirect effects. Cognitive symptoms may play an important role in the relationship between acculturation and panic severity in Latines with asthma and panic disorder.

Unlike language proficiency and nativity, ethnic identity acculturation suggests cognitive acculturation, as the individual actively adopts, internalizes, and identifies with values, attitudes, and beliefs of the dominant culture while progressively relinquishing those or the culture of origin (Padilla & Perez, 2003). Therefore, it is reasonable to expect cognitive acculturation to be related to a cognitive panic symptom such as fear of dying. Cultural cognitive constructs related to a Latine identity have been found to decrease with

increased acculturation. Religiosity is a cultural cognitive construct that may serve as protective factor for Latines and relate to fear of dying. The literature suggests that low acculturation levels are related to higher levels of religiosity for Latines (Page et al., 2020), a cognitive cultural factor that may deteriorate with higher levels of acculturation. Greater religiosity has been associated with better health outcomes (Corona et al., 2017), lower psychological distress (Lara-Cinisomo et al., 2019), and less death anxiety in Latines (Jong et al., 2018; Krause & Hayward, 2014). Taken together, these findings illuminate possible mechanisms than may explain the relationship between higher identity acculturation and fear of dying. Possibly, increased cognitive acculturation erodes cultural cognitive protective factors, like religiosity, increasing death anxiety and fearful cognitions related to dying during a panic attack.

Acculturative Stress and Confusion Between Asthma and Panic Symptoms

When age was controlled for, greater acculturative stress was associated with less confusion between asthma and panic symptoms during a panic attack. Overall, the sample did not experience much symptom confusion, which suggests that participants could largely distinguish between asthma and panic symptoms. Contrary to our finding, we hypothesized that greater acculturative stress would be related to greater symptoms confusion because stress has been associated with subjective interpretation of asthma as stressed induced (Vazquez et al., 2017). Acculturative stress has been associated with more self-reported physical symptoms (Bauer et al., 2012). The significant association between acculturative stress and symptom confusion raises the question of whether stress appraisals form part of an adaptive mechanism for Latines with co-occurring asthma-PD that result in a greater ability to discern panic and asthma symptoms.

Acculturative stress experiences in Latines have been found to be associated with state/trait anxiety (Maldonado et al., 2018) and those with PD are prone to both types of anxiety (McNally, 2002). Those experiencing more acculturative stress may have higher anxiety sensitivity (fear of behaviors or sensations associated with the experience of anxiety) that may results in more sensitivity to acculturative stress and higher awareness of panic symptoms. The lack of confusion between asthma and panic symptoms might be explained by this hypervigilance of anxiety symptoms, which leads to better awareness of differences between asthma and panic symptoms and in turn more awareness of nuance differences in overlapping symptomatology.

Acculturative stress experiences may serve to activate illness specific fear, which can be adaptive and support vigilance and distinction of asthma and panic symptoms. In addition to anxiety sensitivity, negative affect may help explain the study's negative finding. The literature suggests that acculturative stress has been found to be associated with negative affect (Bernal et al., 2022). In turn, negative affect has been found to support individuals with asthma, through illness-specific fear, to discern asthma symptoms more accurately (Mora et al., 2007). Future investigations should aim to assess and control for anxiety sensitivity, negative affect, and illness specific fear when exploring the relationship between acculturative stress and asthma-panic symptom confusion.

Lastly, sample characteristics may further elucidate the association between grater acculturative stress and less symptom confusion. In the study's sample, asthma was poorly controlled and suggests more exacerbations and asthma symptoms. Conversely, panic severity was only "mildly" ill in this sample. Such a difference between severity of asthma and panic may have made the distinction between symptoms easier, especially for individuals

with greater levels of acculturative stress and perhaps higher negative affect or anxiety sensitivity.

Acculturative Stress and Pulmonary Function

We found that greater acculturative stress was associated with lower FEV_1/FVC scores, suggesting that participants who experienced more acculturative stress had lower pulmonary function on the day of testing. Acculturative stress results from the demands of the process of acculturation, an ongoing process with varying sub-stressors depending on stage of acculturation (Berry, 2006). Thus, acculturative stress may constitute a sort of ongoing noxious stimuli for Latine that over-activates the body's stress response system and results in lung damaging allostatic load. Chronic stress has been shown to negatively affect lung function in mice models (Isenberg et al., 1992; Klinnert, 2003). In humans, chronic clinical stress has been shown to play an important role in disease, usually resulting in exacerbation of symptoms, primarily in inflammatory diseases such as asthma. Sandberg and colleagues (2000) found an increase in induction of asthma attacks in children following stressful events. The precipitation of asthma attacks increased even more so for children experiencing chronic stress along with stressful events than for children with stressful events alone (Sandberg et al., 2000). Reductions in multiple measures of lung function were observed for seven-year-old children who experienced high levels of prenatal and two-years-postnatal chronic stress compared to those with low levels of stress (Lee et al., 2017). Chronic stress appears to negatively affect pulmonary function through increased inflammatory response, resulting in worse lung function (Vig et al., 2006). The same mechanism may be involved in relationship with acculturative stress and FEV_1/FVC scores.

Stressors many Latines face due to minoritized status in the U.S. and systemic barriers may constitute an experience of chronic stress. Although the measurement of a general stress construct was beyond the scope of this study, it may prove to be an invaluable avenue for future research aimed at better understanding the role of acculturative stress in lowered pulmonary function. It is possible that non-cultural stressors that we did not account for are responsible for some of the variation in pulmonary function we found. Even if such is the case, cultural factors may still contribute to the overall allostatic load many Latines face throughout the process of acculturation.

Our finding has important research and clinical implications. Future research should investigate whether the positive relationship between acculturative stress and FEV_1/FVC is replicated with healthy Latine who experience acculturative stress, as a significant finding could reveal an important area of focus for clinical interventions that aim to support health outcomes for Latines in the Bronx. Clinicians working with Latine populations with asthma-PD who experience acculturative stress should consider the likelihood of decreased pulmonary function and its impact on functioning.

Non-significant Findings

Acculturation, CR symptoms, and Symptom Confusion. Contrary to our hypotheses, the acculturation proxies, language proficiency and nativity, were not significantly associated with CR symptoms or symptom confusion. Nonsignificant results related to language proficiency are consistent with some of the literature, which has not found a significant relationship between proficiency and number of physical symptoms (Bauer et al., 2012). Nonsignificant findings for nativity, however, are inconsistent with the cited study above, which found an association between increased number of physical

symptoms and U.S. born nativity, with second generation Latines reporting the most physical symptoms. Immigrant generations were outside of the scope of this study; although years in the U.S. was not controlled for in the analyses because it was not associated with CR symptoms. Future investigations regarding nativity should aim to measure and control for years in the U.S. and generation level for Latines when exploring the relationship between acculturation and CR symptoms.

Due to the lack of previous literature exploring the relationship between acculturation and confusion between asthma and PD symptoms, it is especially important to discuss nonsignificant findings between acculturation and symptom confusion. Overall, the study sample experienced low symptom confusion, which may have impacted results. The significant positive relationship between identity acculturation and panic severity and fear of dying may provide some enlightenment. Perhaps, low symptom confusion for the sample results from higher cognitive panic symptoms, which make it easier to distinguish between asthma and panic symptoms.

Acculturative stress and panic severity. Although mainstream U.S. identification was significantly associated with greater panic severity in adjusted analyses, the same was surprisingly not found for acculturative stress and panic severity after controlling for age and ethnicity. This indicates that acculturative stressors may not be a salient reason why identity acculturation is associated with increased panic severity. Perhaps qualities related to U.S. mainstream culture (greater symptom reporting; greater healthcare utilization; aligning with western medical practices; and loss of protective factors) may play a more important role in the severity of panic than stressors related to the acculturation process (demand to adapt to new cultural norms; discrimination; minoritized status). Puerto Ricans have higher rates of

prevalence and morbidity of panic disorder than other minoritized groups (Feldman et al., 2010).

Sample Characteristics

The results from this study are representative of a sample of predominantly female adults with asthma and PD from the Bronx, who largely identified as Puerto Rican. Due to the specific recruitment parameters, the above findings should be interpreted in the context of the sample's demographic characteristics. Few associations were present between demographic variables and the main outcome variables. CR symptoms, fear of dying, confusion between asthma and panic, and FEV_1 percent predicted were not associated with any demographic variable.

The study's largely Puerto Rican identifying sample (83%) may have affected our results. Unlike other Latine groups, Puerto Ricans have U.S.A. nationality and are more numerous in the U.S. mainland (78%) than the island (Capielo Rosario & Dillon, 2020). As such, this group experiences greater ease in migration to the U.S. mainland than other Latine groups (Capielo Rosario & Dillon, 2020), which can result in circular migration patterns and a different process of acculturation than that of other groups. Additionally, differences between the various Latine subgroups were not analyzed due to the size and ethnic homogeneity of the sample and may have influenced our findings. The same is true for gender, as our sample largely identified as female (94.34%). Research has found that the experience of acculturative stress differs by gender (Castillo et al., 2015). This homogeneity between Latine and gender groups warrants further investigation regarding the key differences and their potential in contributing to the results.

Years spent living in the U.S. is another sample characteristic of note. The average number of years spent living in the U.S. for participants born outside of the U.S. mainland was 37.24. Level of acculturation largely increases with more time spent in the dominant culture. With almost 40 years of time spent living in the U.S., this study's sample likely had high levels of acculturation. Prospective investigation should aim to control from amount of time spent in the U.S. and immigrant generation level.

Clinical Implications

The current study suggests that the acculturation dimension of identification with U.S. mainstream culture is positively associated with panic severity and likelihood of experiencing fear of dying during a panic attack when age and ethnicity are controlled for. As such, providers should consider adding ethnic identity measures to diagnostic assessments, as they may suggest points of intervention. Acculturation is a multidimensional process of cultural change and can be reversed or attenuated (Padilla & Perez, 2003). Clinical interventions may target supporting integration of Latine cultural factors with U.S. mainstream culture to promote bicultural protective factors that serve to attenuate the effects of acculturative stress, such as increased social support (Revens et al., 2021). Conversely, addressing panic severity and fear of dying may promote cognitive flexibility, which the literature suggests is associated with biculturalism (Christmas & Barker, 2014). Cognitive interventions may prove to be useful in the treatment of panic for cognitively acculturated Latines, given the relationship between identification with mainstream U.S. culture and fear of dying.

Latine patients may use these findings in the way they shape and advocate for their own health care. Interventions and social support groups related to ethnic identification or

cultural ancestry may be advantageous for Latines by way of creating opportunity for fostering ethnic identity and social support. Interventions, such as the Racial, Ethnic and Cultural Healing (REACH) program (DeLapp & Gallo, 2022), that target understanding and addressing the impact of cultural stressors, may be particularly helpful for people who are experiencing identity dissonance throughout the process of acculturation.

Limitations and Future Directions

The present study has a number of limitations. The study sample is representative of one of the areas with highest asthma prevalence in the country. However, due to the ethnic and geographically specific sample results will not be generalizable to the national asthma population. The homogeneity of gender in the sample further limits generalizability. The specificity of the inclusion criteria aimed at narrowing ethnic group and diagnoses for a highly vulnerable group, while important for our study design, contributed to a small sample size (N=53). Therefore, the small sample size is a noteworthy limitation, as it may have limited the statistical power to expose small yet important effects and contributed to type II error. All measures used were collected prior to the treatment intervention to minimize the impact of the intervention on the results. As such, a cross-sectional study design was employed, with data collection occurring at the first and second sessions of the parent study; this limits the scope in which the results can be generalized. Future research should aim to investigate these variables in a longitudinal design that allows for time to be considered as a covariate and can investigate the stability of the acculturation proxies as exposure to mainstream U.S. culture increases over time. Furthermore, data collection in two different sessions may have reduced sample size due to added burden to participants and contributed

to missing data. Multiple collection points may have also introduced unforeseen factors that were not accounted for in our analyses.

Selection bias is an additional limitation, as individuals chose to participate in a study providing treatment for asthma-PD. Due to the self-report nature of some of the measures, participant bias creates a further limitation. Objective physiological measures, such as cortisol levels for an objective measure of chronic stress and formal language proficiency evaluations should be considered to supplement self-report measures in future investigations (Rudmin, 2009). Acculturation is a complex, multifaceted construct that, many have argued, should not be reduced to proxies. Future studies can address this criticism by utilizing more extensive acculturation scales and analyze the relationship of subscales of acculturation and the studied outcome variables (Lara-Cinisomo et al., 2018). Acculturative stress is also multidimensional and some subdimensions, such as discrimination, are systemic. Future research should aim to investigate acculturative stress and its dimensions, as some may be related to asthma outcomes. Considering chronic stress is associated with poor lung function (Vig et al., 2006), future studies should aim to assess other types of stress and consider controlling for these in analyses.

The limitation of sample size was previously mentioned. Another important limitation to note along with the small sample size is multiple testing. The number of analyses run, given the small sample size, may have increased Type I error due to the repeated use of statistical tests. As such, the possibility of falsely rejecting the null hypotheses should be considered when interpreting results. Future studies should aim to recruit larger samples, ideally more diverse and nationally representative, and limit the number of statistical analyses run to avoid inflating Type I error. A more diverse sample might also allow for a

more variation in acculturation level. This would address another limitation based on a sample characteristic. The average number of years living in the U.S. was high, suggesting a more acculturated sample. Years in the U.S. was not found to be associated with any outcome measure. However, subsequent investigations should control for this acculturation proxy along with immigrant generation level.

Conclusions

This study yielded several findings of note. Greater ethnic identity acculturation was associated with greater panic severity, in adjusted analysis. The more an individual identified with mainstream U.S. culture the more severe their panic severity was. When controlling for age and ethnicity, greater ethnic identity acculturation was associated with experiencing fear of dying during a panic attack. Greater acculturative stress was associated with greater panic severity, in unadjusted analyses. After controlling for age and ethnicity, the findings differed and were nonsignificant. Greater acculturative stress was also found to be associated with a greater ability to distinguish between asthma and panic symptoms when age was controlled for. In both unadjusted and adjusted analyses, greater acculturative stress was associated with lower FEV_1/FVC scores. Other analyses indicated a significant association between ethnicity and panic severity and income and FEV_1 percent predicted scores.

The study also yielded nonsignificant findings. No acculturation proxy was associated with CR symptoms or symptom confusion. Additional analyses revealed that acculturative stress was not associated with percent predicted FEV_1 scores. Overall, the study's findings further support the multidimensional aspect of acculturation and its relationship to health outcomes.

Our findings highlight avenues for future research and intervention for a marginalized population with comorbid health vulnerabilities. Results suggest that cognitions may play an important role in the relationship between ethnic identity and severity of mental illness. Further research is needed to better understand the role of cognitions and possible mechanisms by which cognitive acculturation interacts with health outcomes for Latines with asthma-PD. The study findings can also serve to inform clinical practice with this population. Providers and patients may benefit from addition of acculturation/acculturative stress measures as mitigation of acculturation and related stress may result in better psychological and asthma outcomes. The study presents several interesting and novel results highlighting the need for further research related to acculturation, acculturation stress, related cognitive dimensions, and other variables outside the scope of this study.

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Appendix A

Differential Diagnosis Worksheet: Asthma versus Panic Disorder
(This rating is performed at baseline session.)

Place a check mark below for each item that is more consistent with panic, as opposed to asthma (in parentheses)

_____ **ASPD1**. Participant has experienced recurrent, unexpected panic attacks (versus asthma attacks).
(*) Required for diagnosis of Panic Disorder.

(*) 1 of the next 3 criteria required for diagnosis of Panic Disorder.

_____ **ASPD2.** Participant has experienced one month or longer of persistent concern or worry about having additional **panic** versus asthma (high illness-specific panic-fear) attacks.

_____ **ASPD3.** Participant has significant worry about the implications or consequences of the **panic** attack ("losing control", "having a heart attack", "going crazy") vs. asthma attack (worry related to asthma and appropriate, adaptive illness-specific concerns)

_____ **ASPD4** There has been a significant change in behavior related to the **panic** (avoidance of panic triggers) versus asthma attacks (adaptive avoidance of asthma triggers)

_____ **ASPD5.** Does the onset of symptoms appears to reflect **panic** (rapid onset, typically less than 10 minutes) versus asthma (slower onset)?

Place a check mark below if each item is present, and then indicate whether due to panic or asthma on next line.

Participant has experienced the following symptom(s) as part of (panic vs. asthma) attacks.

_____ ASPD6. palpitations, pounding heart, or accelerated heart rate

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD7. sweating

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD8. trembling or shaking

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD9. sensations of shortness of breath or smothering

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD10. feeling of choking

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD11. chest pain or discomfort

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD12. nausea or abdominal distress

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD13. feeling dizzy, unsteady, lightheaded, or faint

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD14. derealization (feelings of unreality) or depersonalization (being detached from oneself)

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD15. fear of losing control or going crazy

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD16. fear of dying

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD17. paresthesias (numbness or tingling sensations)

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

_____ ASPD18. chills or hot flushes

Check one: Ever due to panic_____ Only due to asthma_____ ? _____

ASPD19. Patient has described at least one attack with **at least 4** of the above symptoms that reflects a **panic attack** (versus asthma attack i.e., wheeze, cough, mucus production are not involved)

Definitely Yes (1) ___

Probably Yes (2) ___

Possibly Yes (3) ___

Not Sure (4) ___

No (5)

_____ ASPD20. Panic attacks are NOT due to direct physiological effects of a substance (drug of abuse, medication) or general medical condition (hyperthyroidism).

_____ ASPD21. Panic attacks are NOT better accounted for by another Axis I mental disorder (e.g., Social Phobia, Generalized Anxiety Disorder etc.).

Place a check mark below next to each item that is present:

_____ ASPD22. Participant has experienced nocturnal awakenings due to symptoms (indicative of **asthma**, but might also reflect panic if no asthma symptoms present)

_____ ASPD23. Participant has experienced fatigue during attacks (indicative of **asthma**, but might also reflect panic)

_____ ASPD24. Participant has *always* experienced coughing during attacks (indicative of **asthma**): **EXCLUSION**

_____ ASPD25. Participant has *always* experienced mucus congestion during attacks (indicative of **asthma**): **EXCLUSION**

_____ ASPD26. Participant has *always* experienced wheezing during attacks (indicative of **asthma**) : **EXCLUSION**

_____ ASPD27. Participant has experienced difficulty with concentration during attacks (indicative of **panic**)

_____ ASPD28. Participant reports frequent yawning in general (indicative of **panic**)

_____ ASPD29. Participant reports sighing frequently in general (indicative of **panic**)

_____ ASPD30. Symptoms of attacks are (were) *always* relieved by albuterol? (indicative of **asthma**)

- **EXCLUSION: IF SYMPTOMS ARE *ALWAYS* RELIEVED BY ALBUTEROL**

_____ ASPD31. Participant appears to be hyper-sensitive to physiological sensations associated with asthma medications (especially albuterol) (eg, tremors, tachycardia) (indicative of **panic**)
NOTE: IF PARTICIPANT DOES NOT TAKE ALBUTEROL IN RESPONSE TO SYMPTOMS, CODE AS 99 (N/A)

_____ ASPD32. Participant reports normal peak flow during attacks. (indicative of **panic**)
NOTE: IF PARTICIPANT DOES NOT MEASURE PEAK FLOW, CODE AS 99 (N/A)

Place a check mark below for each item that is more consistent with panic, as opposed to asthma (in parentheses)

_____ ASPD33. Triggers of some attacks appear to be related to **panic** (e.g., stressful thoughts or events, crowds, warm and stuffy rooms) versus known asthma triggers (e.g., cigarette smoke, cockroaches, cats, pollen, food allergies, poor air quality, pollution, cold air

Agoraphobia Criteria (agoraphobia versus fear of asthma attacks).
The following two items are *required* for diagnosis of agoraphobia.

_____ ASPD34. Anxiety about being in places or situations from which escape might be difficult (or embarrassing) or help may not be available in the event of having an unexpected panic attack **versus** avoidance of situations involving asthma triggers)

_____ ASPD35. Situations are avoided or endured with marked distress/anxiety about having panic attack or panic-like symptoms (or require the presence of a companion) **versus** adaptive avoidance of asthma triggers

_____ ASPD36. **Your assessment of the participant's ability to distinguish between symptoms of panic and symptoms of asthma:**

1	2	3	4	5
Always can distinguish between panic and asthma	Most of the time can distinguish between panic and asthma	Some of the time can distinguish between panic and asthma	Hardly at all can distinguish between panic and asthma	Never can distinguish between panic and asthma

_____ ASPD37. **Overall assessment (circle the item below). "Other" disorder includes psychiatric and medical**

1	2	3	4	5	6	7
Definitely Panic	Probably Panic	Possibly Panic	Sure	Not Asthma Or Other	Possibly only Asthma Or Other	Probably Only Asthma Or Other

_____ ASPD37REVISED:. **If overall assessment was revised after supervision (circle the item below). "Other" disorder includes psychiatric and medical**

1	2	3	4	5	6	7
Definitely Panic	Probably Panic Only Asthma Or Other	Possibly Panic	Sure	Not Asthma	Possibly only Asthma Or Other	Probably Asthma Or Other

Please list all Axis I disorders for this participant below:

Diagnosis: _____ _____ _____ Code: _____
Diagnosis: _____ _____ _____ Code: _____
Diagnosis: _____ _____ _____ Code: _____
Diagnosis: _____ _____ _____ Code: _____

Comments: