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Parent and Child Acculturation Differences: Sleep and Weight Outcomes in Latinx Pre-Adolescents

Kelsey K. Zaugg
Brigham Young University

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Kelsey K. Zaugg

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Chad D. Jensen, Chair
Blake L. Jones
Scott Baldwin
Eric Ruiz Bybee

Department of Psychology

Brigham Young University

ABSTRACT

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Kelsey K. Zaugg
Department of Psychology, BYU
Doctor of Philosophy

Introduction: The present study aimed to evaluate associations between parent-child acculturation differences and sleep and weight outcomes in Latinx pre-adolescents aged 10-12 years. Parent and child stress were considered as possible mediators through which parent-child discordance in acculturation may negatively impact sleep quality and body fatness. Pre-adolescent resilience and ethnic pride were explored as possible personal strengths that may ameliorate the impact of this association.

Method: Data from mothers, fathers, and pre-adolescents were collected on two occasions separated by one year. In our sample, only language-specific acculturation was significantly different between parents and children. Thus, parent-child language difference was a predictor in our analyses as planned and parent and child cultural-value specific acculturation were considered as separate predictors, rather than as a difference between them. A path analysis using structural equation modeling was used to address our research questions including mediation and moderation effects.

Results: In initial models, mother-child language difference and acculturation scores did not significantly predict child health outcomes and stress did not emerge as a mediator. The most consistent predictors of child zBMI throughout models were child pubertal status and number of years parent has been living in the U.S. ($t(123)$=.04, p=.02). After adding child resilience and ethnic pride to analyses, mother-child language difference and child cultural value-specific acculturation score interacted with child resilience to predict child waist circumference and sleep duration ($t(123)$=2.13, p=.005; $t(123)$=-2.59, p=.02). Additionally, child cultural value-specific acculturation interacted with ethnic pride to predict zBMI at timepoint two ($t(123)$=2.53, p=03) and ethnic pride predicted child zBMI ($t(123)$=-1.89, p=.03).

Conclusions: Understanding the individual contexts and strengths of any group of people can help promote better health and inform interventions. The current study aimed to speak to some of this nuance by including bidimensional measures of acculturation and focusing on cultural and individual strengths. Our results would suggest that ethnic pride and resilience are strengths that could make a difference for young Latinxs, despite the possible adverse implications of the acculturation experience.

Keywords: acculturation, Latinx, weight, sleep, parent-child relationships

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Outcomes in Latinx Pre-Adolescents

The Latinx[1] population living in the United States (U.S.) is a large and diverse group that continues to grow. Mexican Americans make up the majority of this population, comprising 62% of US Latinx people (Noe-Bustamante et al., 2020). Regarding the strengths and wellbeing of Latinx children relative to their non-Latinx white peers, research has shown that they have robust social development and strong family foundations that contribute to early achievement in many domains (Coll et al., 2009). Moreover, the collectivistic nature of many Latinx communities serves as a protective factor for children and families against many adverse experiences (Bermudez & Mancini, 2012). This strong social support has been linked to the relative resiliency that is found among many Latinxs in the U.S. (Bermudez & Mancini, 2012).

However, despite the many cultural and individual strengths that Latinx youth and their families possess, there is a history of marginalization, negative stereotyping and discrimination toward this and other ethnic/racial groups in the U.S. (Chavez-Dueñas et al., 2019; Finding et al., 2019). While many Latinx immigrant parents come to the U.S. searching for a better life, pervasive and systemic socioeconomic and political structures often make it difficult for some Latinxs to truly thrive. For example, compared to their non-Latinx white peers, Latinx youth experience higher rates of obesity, overweight, and diabetes (Kosack & Ward, 2020) and also tend to have worse sleep outcomes compared to their non-Latinx white peers (Yip et al., 2020; Guglielmo et al., 2018). Concerning mental health, Latinx youth also tend to have higher rates of depression and suicidal behaviors compared to their non-Latinx white and Black peers (Held et

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[1]The author chose "Latinx" to describe this population as an inclusive, gender neutral term. However, it is important to acknowledge that preferences such as "Latinx", "Latino", and "Hispanic" will vary depending on age, region, and other individual factors

al., 2020). A wide variety of sociocultural factors have been shown to contribute to the increased prevalence of health problems in these youth including limited healthcare access (Morales et al., 2002), disparate rates of poverty (Morales et al., 2002), food insecurity, and social marginality (Vega et al., 2009). Acculturation, or the process of cultural and psychological change that results from one cultural group coming in contact with another cultural group, is another possible explanation for why these health disparities exist for Latinx youth that is being explored in the research (Berry, 2005).

Broadly speaking, acculturation is a complex, multidimensional concept. In order to address this multidimensionality, the current study breaks acculturation into two main components: Language preference/use and cultural values. In the past, language alone has been used as a proxy for acculturative status (i.e., if they spoke English at home, they were more acculturated). This alone has been criticized as insufficient to represent the complex construct. However, research does suggest that language use and preferences should be considered as an important element of acculturation but must be explored in further detail than simply language spoken at home (Lopez-Class et al., 2011). Furthermore, there is a need for a more culturally-focused approach to representing acculturation. Despite "culture" being a very part of the word acculturation, specific Latinx values have not been adequately represented in the literature on acculturation (Raffaelli, 2005). In an effort to address this disparity, "enculturation" is another term that has been introduced which represents the other "side" of acculturation, or the degree to which an individual learns and identifies with their own cultural norms, values, and expectations (Gonzales et al., 2004). Thus, instead of only considering subscription to the mainstream values of the "dominant" culture, enculturation considers the values of the culture of origin as well. This bidirectional view of acculturation is important to consider in the study of acculturation moving

forward. For the purposes of this study, "acculturation" will be the term predominantly used, but with these more nuanced considerations in mind.

Berry (2005) posits that "integration" is the best the way for one to adjust to a new culture. Integration implies that one has held onto their own cultural values, while also adopting some of the values and strengths of their new home. However, this healthy integration is not always the experience of minoritized[2] groups in the U.S., and high acculturation has been shown to have negative impacts on health among Latinx youth and adults in the U.S. Possible reasons for this include increases in stress, adoption of unhealthy habits such as substance use, and more access to unhealthy foods (e.g., fast food is a cheap and accessible option; Rudmin, 2009). This cultural shift often occurs when a minority group is introduced to a majority group and feels social pressure to conform and assimilate to the more "dominant" majority culture (Arcia, Skinner, Bailey, & Correa, 2001), thus leaving behind many of the strengths and values of their heritage. Among Latinx immigrants, less time in the U.S. is associated with better health outcomes despite generally less access to education and healthcare. Many have speculated on reasons why less acculturation to "mainstream" U.S. values would be a protective factor for Latinx youth, including maintenance of ethnic pride, temporary escape from stressors in their native country, and initial hope for attaining the "American Dream" (Torres et al., 2018; Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005). However, as Latinxs remain in the U.S. longer, the benefits immigrants initially experience tend to dissipate and Latinx youth have increasingly worse health outcomes compared to their non-Latinx white peers (Archuleta, 2010). Thus, 2nd and 3rd generation Latinxs experience negative physical and mental health effects to a higher degree than 1st generation immigrants (Torres et al., 2018).

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[2] "[the term] minoritization recognizes that systemic inequalities, oppression, and marginalization place individuals into "minority" status rather than their own characteristics" (Sotto-Santiago, p. 73, 2019).

Several possible mechanisms have been explored in the literature to understand what could contribute to this phenomenon. For example, behaviors typical in the U.S. such as eating fast food, fad dieting, and alcohol consumption are thought to be associated with higher acculturation and could account for some of the negative health outcomes in minoritized youth (McLeod et al., 2016; Ahluwalia et al., 2007). Additionally, factors such as poverty, stress, and food insecurity have been linked to health concerns including obesity, diabetes, and heart disease (Lara et al, 2005). Thus, there is not one simple answer to address this issue and better serve these communities, but rather it is a multifactorial and complex issue and warrants greater exploration and intervention, especially among Latinx youth.

A Contextual Approach

To better understand the health disparities among Latinx youth, it is important to take a research approach that is integrative and contextual to address the complexity of acculturation and the experience of Latinxs in the U.S. (Abraído-Lanza et al., 2017; Riedel et al., 2011). The Ecological Systems Theory (Bronfenbrenner, 1992) is a contextual approach that is used to inform the current study. Limiting research to focus only on the child as an individual without considering the impact of their immediate environments (e.g., family) would not adequately speak to the nature of different physical and mental health phenomena (Onwuegbuzie, 2014). In the case of existing as a marginalized group in the U.S., broader social and cultural values should also be considered to better serve and celebrate these communities (Baldwin-White, 2017; Paat, 2013). For Latinxs, their generally strong emphasis on family connectedness and collectivism are further cause for approaching research with this population through a systems approach.

Furthermore, acculturative stress has been conceptualized within an integrative cultural-ecological model (Coll et al, 1996). This model is based on the idea that social mechanisms such

as racism and segregation can account for negative health and development of youth of color due to the social demands that they face in the U.S. society (e.g., discrimination, acculturative factors). Informed by this model, Romero and Roberts (2003) introduced the idea of *bicultural stress*, which reflects the conflict that can arise when trying to navigate and accept two differing cultures. Parental acculturative stress has been shown to have an adverse impact on the behavioral and emotional health of Latinx youth (Borrego et al., 2019; Lorenzo-Blanco et al., 2016).

The acculturation gap, or the observation that parents and their children tend to acculturate at different rates, with children acculturating more quickly than their parents (Kim et al., 2020), examines the parent-child dynamic among Latinx families in the context of their differing cultural experiences as a marginalized group in the U.S. The acculturation gap-distress hypothesis posits that this gap can lead to family conflict and emotional distress (Lau et al., 2005). While the research thus far widely uses the term "acculturation gap" to describe this phenomenon, it is important to move on from a "deficits-based" framing to a "strengths-based" framing when working with minoritized groups. This redirects "blame" from the parents and children and highlights that this is a factor influenced by broader societal issues. Thus, the current study will use the term "parent-child acculturative differences" in lieu of "acculturation gap" from this point forward.

Related to these parent-child acculturative differences, parents are facing the potential challenges of parenting a child who is becoming more quickly acculturated than them through public schooling, peer groups, and extracurricular activities. With family connectedness and support as an important cultural factor for many Latinxs (Morales et al., 2002), these differences can be unique and challenging stressors that many will have to face. As parents may try to hold

onto their cultural heritage, their children are learning English more quickly and possibly straying further from their family's cultural roots.

Moreover, pre-adolescence is a time where this difference may become especially evident, as children are placing more importance on peer influence than ever before (Mills et al., 2014). In an effort to fit in socially, it becomes especially important for young people to assimilate to the status quo, potentially leaving behind some of the strengths of their Latinx heritage and increasing differences between parent and child acculturation. This process can vary significantly depending on many individual factors, but it is assumed that broadly speaking, acculturation to the U.S. can be a very stressful experience for many (Fanfan & Stacciarini, 2020).

Research on the impact of parent-child acculturation differences and acculturation more broadly on youth health outcomes so far is scant and inconclusive, but results suggest that greater acculturation difference could be associated with risky behavior in Latinx adolescents such as drug and alcohol use, suggesting an impact of this difference on health behavior (Marisiglia et al., 2016). Moreover, a recent study found that greater parent-child acculturative differences were associated with increased child body mass in Latinx youth (LeCroy et al., 2021). This suggests that parent-child acculturation differences could contribute to a disparity in overweight and obesity prevalence in Latinx children. However, the possible impact of parent-child acculturation differences on other health outcomes such as sleep, and potential mediators have not been thoroughly explored. Regarding sleep, this relationship has not been measured directly, but family connection is associated with healthy sleep outcomes in Latinx youth (Sasser et al., 2020). Thus, the disruption in connectedness in the family due to acculturative differences could contribute to sleep problems.

Health Outcomes and Latinx Youth

Regarding physical health, Latinx immigrants in the U.S. have been found to live longer than the general population, despite less access to education, health care, and lower socioeconomic status (Escarce et al., 2006). This has come to be known as the "Latinx Paradox" and researchers have attributed this to a number of factors including lower smoking rates, better diet, and stronger social support. However, as immigrants spend more time in the U.S., these benefits tend to decrease, suggesting that increased acculturation to the U.S. tends to be associated with more health problems for Latinx youth and their families (Kosack & Ward, 2020). In addressing the literature thus far on acculturation and weight and sleep outcomes in Latinx youth, much of the research is based off of acculturation broadly and not necessarily the difference between parent and child acculturation. However, information regarding the impact of acculturation generally on Latinx youth is still helpful in guiding the rationale for the present study.

Weight

The prevalence of childhood overweight in the U.S. among Latinx youth is 41.8% and the prevalence of obesity in this population is 21.6%. Among non-Latinx white youth, the prevalence is 29.5% and 15.7%, respectively (Skinner et al., 2018). While obesity and overweight clearly impact many youths in the U.S., research on health correlates, prevention, and treatment among Latinx youth is lacking, despite the fact that they are the fastest growing population in the U.S., making up 22% of all children under the age of 18 (Isasi et al., 2016). Research thus far has found some possible genetic, environmental, and social factors that could contribute to this disparity in Latinx youth (Toledo-Corral et al., 2021; Kornides et al., 2011). Socioeconomic disadvantages among Latinx communities in the U.S. appear to be an obvious

contributor to the weight disparities between Latinx and non-Latinx white youth. Low

socioeconomic status is linked to food insecurity, or the economic and social condition of limited

or uncertain access to adequate food (Flóres et al., 2019; Murthy, 2016). Moreover, children of

foreign-born Latino mothers have greater food insecurity compared to children of U.S.-born

Latino mothers (Arteaga et al., 2017). Compared to foreign-born and native-born white people in

the U.S., Latinxs are significantly more food insecure (Myers & Painter, 2017). Food insecurity

is associated with increased body mass index in Latinx youth and adults (Papas et al., 2016).

However, socioeconomic status and food security alone do not appear to totally explain the

disparity in weight status among Latinx youth. Further understanding of the Latinx experience in

the United States through a family system lens is necessary to better serve these populations.

Acculturation in the context of youth weight status and the family has begun to be explored in

the literature, but much of this research so far does not use culturally validated measures for

Latinx families and is lacking in methodological rigor.

Furthermore, social factors such as acculturation have been considered in the research as

a possible contributing factor to obesity among Latinx youth. For example, Simmons and

Limbers (2019) showed acculturative stress to be associated with increased emotional eating in

Latinx youth. Moreover, in the context of Latinx families, higher family acculturation is linked

to increased consumption of sugary beverages in youth, a strong contributor to weight gain in

children and adults (Figueroa et al., 2020). However, research on acculturation and weight

outcomes is not particularly robust, especially among Latinx children. While it is generally

accepted that acculturation, in some form, has an impact on Latinx health outcomes and

development, more nuance and in-depth exploration is necessary (Alidu & Grunfeld, 2017). In a

relevant review on this topic, Mcleod et al. (2016), highlighted the inconsistencies in results

related to acculturation and obesity. Some research among children has found a positive association between acculturation and weight, while others found that lower levels of acculturation were associated with increased weight. Extant research has noted the importance of using mediation and moderation models to better understand acculturation and health outcomes. The authors also reported a need for more comprehensive, bidirectional measures of acculturation rather than proxies for acculturation like generational status and language use at home. Lastly, longitudinal study designs, rather than cross-sectional designs, are necessary to better understand the prospective impact of acculturation on obesity and other health outcomes.

Sleep

Sleep is a vital health behavior for healthy development in children and adolescents (Chaput et al., 2016; Gradisar et al., 2011). Deficits in sleep duration and quality over time can lead to serious health concerns. The extant research literature on the associations between sleep and ethnic minority status has shown that non-Latinx white youth generally have better sleep outcomes than Latinx youth (Guglielmo et al., 2018). Latinx youth have shown to have shorter sleep duration in the U.S. than their non-Latinx white peers. Furthermore, children with shorter sleep duration are more likely to be overweight and have higher body mass index (BMI) at a 5-year follow-up (Snell, Adam, & Duncan, 2007). This finding and many others showing associations between poor sleep and obesity highlight how sleep and weight outcomes are related health behaviors that unequivocally impact Latinx youth in the U.S.

Recent research has started to examine the impact of acculturation on sleep behaviors in Latinx youth. Higher acculturation in adolescents has been linked to shorter sleep duration (Ebin et al., 2001). Furthermore, a study evaluating sleep habits in adolescents found those that identified as "Mexican American" to have higher rates of insomnia than those that identified as

only "Mexican", suggesting that acculturation to the U.S. could play a role in sleep issues among Latinx adolescents (Roberts et al., 2004). However, consistent with research broadly on acculturation, robust measurement and methodological rigor is lacking from the already scant literature on sleep outcomes in Latinx youth (Loredo et al., 2010).

In the context of Latinx families, some research has also started to examine the impact of parent acculturation on child sleep, which is relevant to the systems approach that the current study employs. Higher parent levels of acculturation are associated with shorter sleep duration in their offspring (Martinez-Miller et al., 2019). Among adolescents, lower parental acculturation was associated with more healthful sleep in Latinx adolescents (McHale, Kim, Kan, & Updegraff, 2011). The intergenerational impact of acculturation, including the construct of parent-child acculturation differences, is an important area of exploration for future research on this topic. Generally, both sleep and weight are not as well understood in the context of acculturation and parent-child relationships.

Stress as a Mediator

Sleep problems, obesity, and acculturation are all associated with a similar construct: stress (Scott et al., 2012). LeCroy et al. (2021), mentioned previously, noted the importance of addressing possible mediators of the effect of parent-child acculturation differences on child health outcomes, such as stress. More specifically, assessing stress as it relates to the experiences of Latinx adults and children in the U.S. (bicultural stress) could speak to the unique and challenging experience of being a minoritized ethnic group. Factors such as language conflict, economic stress, immigration stress, and discrimination are all important stressors to consider. The acculturative process and its related stress have been discussed previously, but it is worth noting how stress can impact sleep and weight.

Generally speaking, chronic stress has been linked to overweight and obesity in children and adults due to its impact on eating behaviors and physiological processes (Tajik et al., 2014). Parental stress is associated with increased body mass index in pre-adolescents over time, highlighting the importance of considering the child within the context of the family in formulating research questions. Moreover, parent perception of their own stress is associated with unhealthy eating habits and higher body mass index in their children (Baskind, 2019; Tajik et al., 2014; Parks et al., 2012).

Related to sleep and especially relevant to the current study, Sladek et al. (2020) found Latinx adolescents' experience of bicultural stress to negatively impact sleep duration and quality. Greater bicultural stress was associated with shorter average sleep duration in these Latinx adolescents. Gender moderated this relationship as boys were more greatly impacted by this relationship compared to girls. Additionally, greater daily bicultural stress predicted more time to fall asleep at night. This recent and novel study shows the potential of bicultural stress impacting health outcomes such as sleep in Latinx youth. A more in depth understanding of this relationship is warranted and exploring this in the context of parent-child acculturative discrepancies can further add to this research.

Furthermore, cortisol, referred to often as the "stress hormone", has been identified as a likely mechanism through which chronic stress impacts health (Adam & Kumari, 2009). Produced by the hypothalamic pituitary adrenal (HPA) axis, cortisol release is an important biological response to stressful situations and maintenance of homeostasis in the body. The cortisol awakening response (CAR) represents the peak production of cortisol that occurs in the first 30-45 minutes after waking that is thought to physiologically prepare a person for the day ahead of them (Steptoe, 2016). Dysregulation in the CAR cycle is related to a number of

different physical and mental health challenges including obesity and sleep complications (Fries et al., 2009). The peak of the CAR response is lower in adolescence compared to adults, but it has similarly shown that atypical CAR response in children and teens is associated with stress and anxiety in typically developing populations (Platje et al., 2013). CAR abnormalities and associations with stress have also been demonstrated in Latinx pre-adolescents in a study that showed the CAR response to be negatively associated with depressive symptoms in this sample (Taylor et al., 2018). However, research is lacking on the CAR response in children and Latinx children in particular, especially as it relates to sleep and weight outcomes. This more objective physiological measure of the stress response can add meaningfully to the literature on acculturation and health outcomes in Latinxs.

Resilience and Ethnic Pride as Protective Factors

In considering the health disparities between Latinx youth and non-Latinx white youth, it is necessary to explore possible protective factors in order to bolster these strengths in Latinx youth (Rodriguez & Morrobel, 2004). There are deeply rooted societal and political systems that can stand in the way of addressing these disparities on a larger scale, but research on protective factors can help inform potential interventions and facilitate social change. While there are many potential strengths to explore, resiliency and ethnic pride are two notable constructs that have been linked to healthy development in Latinx youth (Taylor et al., 2019; Meca et al., 2017). Ethnic pride is often considered in the scientific literature as an element of resiliency among Latinxs. Thus, greater resilience is associated with higher ethnic pride and identity in Latinx youth, both of which are associated with increased optimism and stronger mental and physical health adjustment (Bosma et al., 2017). Despite both of these strengths serving as protective

factors broadly, they have not been examined as a moderator related to the relationship between parent-child acculturation differences and sleep and weight outcomes in Latinx youth.

Resilience Theory (Masten, 2014) is one conceptualization presented in extant literature of what resilience is and how it may serve as a protective factor in the context of Latinx youth health outcomes. Resilience Theory emphasizes the processes of adaptation under extremely challenging conditions and how this can impact development across the lifespan. It suggests that risk must be present for resilience to form. Resilience Theory also shares roots with Positive Youth Development Theory (Lerner et al., 2005), which specifically examines individual and contextual factors that contribute to positive development in youth. Both of these theories guide the current study in achieving a more robust systems approach to understanding adverse health outcomes in Latinx youth. In accordance with Resilience Theory, the current study addresses a population that does experience very challenging conditions that warrant serious adaptation and therefore examines the impact of resilience more broadly on these outcomes. Additionally, consistent with Positive Youth Development Theory, this study examines ethnic pride as an individual factor that could promote healthy adaptation as well as resilience more broadly.

Furthermore, resilience describes one's ability to adapt in the face of challenges and cope with stress (Cardoso & Thompson, 2018). Resilience has been linked to better mental health and psychosocial outcomes across the lifespan (Hu et al., 2015; Henley, 2010) and has been studied in several different ways. However, based on research on the intersection of neurobiology and psychology, research on resilience is most relevant to study in the context of stress sensitivity, or one's responsiveness and adaptation to stressful life circumstances (Rutten et al., 2013). Despite the increase of research on resilience and different mental and physical health outcomes, there are few studies that examine resilience in the context of Latinx families (Cardoso & Thompson,

2018). Many have assumed, due to the phenomenon of the "Latinx Paradox", that Latinxs are generally resilient, but necessary research has not been conducted to understand how resilience may or may not serve as a protective factor for this population, especially as it relates to physical health outcomes.

Broadly, resilience is linked to positive physical health outcomes in different illnesses, both chronic and acute (Mandiü & Pavloviü 2020). Research has shown greater resilience may prevent illness such as heart disease and it ameliorates the negative impact of illnesses that are contracted such as cancer. Thus, higher trait resilience is associated with lower vulnerability to the adverse effects of physical and mental health concerns. However, resilience is still a fairly new construct being explored in the literature, and more research is necessary to better evaluate this trait, especially in Latinx populations. Concerning sleep and body fat outcomes and their relationship with resilience, resilience has not been thoroughly explored.

Furthermore, family resilience is linked to better sleep quality of parents with children who have epilepsy, likely due to the moderating effect of resilience on intense stressors (Liu et al., 2021). Lower emotional resilience in response to a stressor is also associated with increased body fat in adults (Mujica-Parodi, 2009). Preliminary research on resilience and obesity in children suggests that resilience could be a possible moderator of obesity development (Foster & Weinstein, 2019), however more research is warranted, especially among diverse populations. Intervention programs in the past that have targeted resilience in youth are often criticized for their lack of cultural competency (Ungar & Russell, 2014). Thus, the need for increased understanding of the role of resilience in health outcomes of Latinx youth is great.

Moreover, Panter-Brick and Eggerman (2011) described cultural values as the "bedrock of resilience," suggesting that one's relationship to their cultural identity is a crucial piece of

coping and adapting to life's challenges. Ethnic pride, or the degree to which someone identifies with and takes pride in their own ethnicity and culture (Guilamo-Ramos, 2009), can build resilience in Latinx youth in the face of discrimination and racism (Carranza, 2007). Furthermore, the process of acculturation can often include a loss of ethnic identity and pride, especially for youth who are hoping to fit in with their peers and avoid discrimination (Lopez et al., 2018). In Latinx youth, higher acculturation/assimilation to the U.S. is associated with decreased ethnic pride and negative mental health outcomes including anxiety and depression (Perreira et al., 2019). However, integrated Latinx youth who hold onto their ethnic pride and are able to adapt to the "dominant" culture, in other words, they have a healthy balance of acculturation and retention of their ethnic origins, have better overall health outcomes (Arandia et al., 2018). This speaks to the protective power of ethnic pride against some of the adverse effects of acculturation. Additionally, maintenance of cultural heritage was found to be important for youth adjustment, regardless of parent acculturative status (Telzer et al., 2016), suggesting that, even despite higher system-level influences such as parental factors, ethnic pride could be an individual protective strength in Latinx youth.

Furthermore, increased ethnic pride has also emerged as a protective factor against adverse health behaviors. For example, higher acculturation is associated with more substance use in Latinx youth including nicotine and alcohol, but ethnic pride moderates this relationship such that greater ethnic pride attenuates the association between high acculturation and substance use (Castro et al., 2010). While ethnic pride has not been explored as a protective factor against adverse weight and sleep outcomes in Latinx youth, the literature would suggest that ethnic pride could have an impact on health outcomes beyond substance use. For example, a recent study showed ethnic pride and healthy integration of native culture to be linked to healthier eating

patterns (Arandia et al., 2018). More research is necessary to understand the extent to which ethnic pride can serve as a protective factor against other additional adverse health outcomes.

Present Study

The present study sought to explore parent-child acculturation differences, ethnic pride, resilience, and stress as possible factors contributing to adverse sleep and weight outcomes in Latinx pre-adolescents. Examining these health disparities among Latinx youth using a systems approach could help to explicate the experience of acculturation and health among this population in a more comprehensive way. Comprehensive assessment of acculturation was used to address potential nuance present in this relationship and fulfill a need in the current literature. Additionally, a longitudinal design rather than a cross-sectional design was implemented to allow for more methodologically sound evaluation of potential mediators. Lastly, this study explored possible protective factors of Latinx pre-adolescents to highlight their cultural strengths. Understanding these factors is important to inform future interventions in a culturally sensitive and strengths-based way.

Aims and Hypotheses

Aim 1

Our first aim was to verify whether there are differences in acculturation levels between parents and children, which would support an "acculturative difference". This was necessary to build our model and test hypotheses related to the impact of this differene on health outcomes. We also examined how acculturation changed over the two timepoints for parents and children. The multidimensional nature of acculturation was assessed with subscales from two separate acculturation measures: The Language subscale from the Acculturation Rating Scale for Mexican Americans-II and subscales of the Mexican American Cultural Values Scale. Total

scores were used from each of these measures as our indicators for acculturation of parents and children. These measures were chosen to represent the multidimensional and bidirectional nature of acculturation that is lacking in past studies on this topic (McLeod et al., 2016).

Hypothesis 1a. We hypothesized that parents would be less acculturated than their pre-adolescent child on both of the aforementioned measures of acculturation. We expected this effect to hold at timepoint one and between timepoints one and two. In past literature, this difference has been present among Latinx parent-child dyads (Kim et al., 2020), which informed our hypothesis.

Hypothesis 1b. We hypothesized that both parents and children would be more acculturated at timepoint two compared to their individual acculturative levels at timepoint one. Thus, the longer parents and children are in the U.S., the more acculturated they would become. This hypothesis is in accordance with studies on the experience of ethnic minority groups in the U.S. (Lara et al., 2005).

Aim 2

Our second aim was to examine the impact of the mother-child acculturation differences at timepoint one on child body composition characteristics (i.e., zBMI and waist circumference) and sleep quality and duration at timepoint two.

Hypothesis 2a. Given previous research conducted by LeCroy et al. (2021), we hypothesized that as the difference between mother-child acculturation increases, child zBMI and waist circumference would increase both concurrently and longitudinally.

Hypothesis 2b. While parent-child acculturation differences and sleep outcomes has not been directly studied, based on research on the impact of acculturative processes on sleep (Martinez-Miller et al., 2019; McHale, Kim, Kan, & Updegraff, 2011), we hypothesized sleep

duration would shorten and sleep quality would worsen in association with a greater increase of parent-child acculturation differences.

Aim 3

Next, we aimed to explore whether mother and child stress mediated the relationship between parent-child acculturation differences and adverse child health outcomes. We addressed this with a broader biomarker of stress (i.e., cortisol awakening response) as well as specific measures of bicultural stress (i.e., the Hispanic Stress Inventory (for parents) and the Multicultural Events Scale for Adolescents) to speak to the unique stressors ethnic minorities face as a part of the acculturative process.

Hypothesis 3a. In accordance with past research on the impact of bicultural stress on Latinx youth (Sladek et al., 2020; Shankardass et al., 2014), we hypothesized that child and mother bicultural stress would mediate the relationship between mother-child acculturation differences and child health outcomes such that greater levels of personal and maternal bicultural stress will predict a stronger association between mother-child acculturation differences and negative health outcomes (Baskind, 2019; Tajik et al., 2014; Parks et al., 2012).

Hypothesis 3b. While the research on directionality of the CAR response and its implications for health outcomes is not fully understood, especially in Latinxs samples, we hypothesized that lower CAR (Sladek et al., 2017) would mediate the relationship between mother-child acculturation differences and child sleep and body composition characteristics such that this association would predict a stronger association between our predictor and outcome variables.

Aim 4

Next, informed and supported by Resilience Theory (Masten et al., 2014) and Positive Youth Development Theory (Lerner et al., 2005), we aimed to explore possible child strengths that could mitigate the impact of stress and acculturation on adverse health outcomes. Specifically, a broad measure of resilience (The Connor-Davidson Resilience Scale 10) and a more culturally-specific component of resilience, ethnic pride (measured by Thayer's (2002) 4-item ethnic pride scale), were considered as possible protective factors.

Hypothesis 4a. Based on past research on protective factors against adverse development in Latinx youth (Taylor et al., 2019; Meca et al., 2017), we hypothesized that resilience would moderate the association between mother-child acculturative stress and adverse health outcomes, such that greater resilience would attenuate the association between mother-child acculturative stress and weight and sleep outcomes.

Hypothesis 4b. According to research by Arandia et al. (2018), we also hypothesized that ethnic pride would moderate the association between mother-child acculturative stress and adverse child health outcomes, such that greater ethnic pride would attenuate the association between mother-child acculturative stress and weight and sleep outcomes.

Aim 5

Our final aim was an exploratory aim to consider the possible relationship of father-child acculturation differences on adverse health outcomes. Due to the fact that fathers were not required to participate in the present study, there is significant missing data for fathers and therefore these data will not be included in our statistical models for aims 1-4. Considering the lack of data/research from fathers in the research literature and the fairly large number of fathers who participated in our sample, we believed it would be important to explore the possible

dynamic of father-child acculturation differences which could further add to the literature. Thus, analyses from Aims 2 to 4 were replicated with fathers in place of mothers.

Method

Participants

Participant data for this study were drawn from a larger dataset that was collected as part of "Project Salud" (PIs: Drs. Blake Jones and Zoe Taylor). The primary author of this study is a non-Latinx white, U.S.-born, affluent graduate student who is not a part of the Latinx community. Project Salud was created to explore strengths and challenges facing Latinx families in Indiana. RFamilies that participated in the project were initially recruited from communities in Indiana after receiving institutional review board approval from Purdue University. Inclusion criteria were that child and biological mother both participated, that the child was in fifth or sixth grade (ages 10–12), and that both mother and child self-identified as Latinx.

While mothers' participation was required in order to be recruited for the study, fathers' participation was encouraged but not mandatory. The sample for analyses consisted of 119 children and their mothers (Table 1). Twenty-two of these dyads dropped out of the study at the second timepoint. Seventy-six fathers also participated in the study.

Table 1

Child Sociodemographic Characteristics at Timepoint One

Covariates	Mean (SD) or %	N
Age	11.53 (.69)	
Biological Sex		
Boys	42.9	51
Girls	57.1	68
Pubertal Status (1=not yet begun; 2=has barely started' 3=is definitely underway; 4=growth definitely seems completed)	2.03 (.53)	
Family income (12 mo)		
< $10,000	10.2	11
$10,001 to $15,000	10.2	11
$15,001 to $20,000	9.3	10
$20,001 to $25,000	21.3	23
$25,001 to $30,000	9.3	10
$30,001 to $35,000	4.6	5
$35,001 to $40,000	15.7	17
$40,001 to $50,000	7.4	8
$50,001 to $60,000	5.6	6
>$60,000	6.5	7
Parent marital status		
Single	5.1	6
Married/Cohabitating	85.6	101
Parent country of origin		
U.S.	1.7	2
Mexico	95.8	114
El Salvador	.84	1
Nicaragua	.84	1
Peru	.84	1
Parent time in U.S. (years)	16.4 (5.59)	

Independent Variables	Mean (SD)	Range
Child zBMI	1.24 (.92)	-1.57, 2.72
Child Waist Circumference	80.22 (13.63)	57.5, 122.5
Child Sleep Duration	462.77 (85.91)	191, 705
Child PSQI	38.55 (8.15)	20, 59

Procedure

Families were visited a total of four times in their homes by two research assistants that spoke both English and Spanish. The first two visits and the second two visits were separated by one year. At the first visit, participating parent-child dyads completed questionnaires (offered in either Spanish or English depending on participant preference) and their height, weight, and waist circumference were measured by the research assistants. Height was determined using a SECA 213 Stadiometer and weight was determined with a SECA 899 portable, flat digital scale with remote display. Questionnaire packets included several measures that took about 90 minutes for parents to complete and 60 minutes for youth to complete at each visit. Research assistants dropped off these materials and were not present as the families filled out the questionnaires. Participants were also given their Fitbit devices and instructed on how to wear them. The Fitbits were restricted to only display time and stairs to keep participants from behaving differently based on their results. Their geographic location was not tracked.

Additionally, at this initial visit, mothers, children, and participating fathers were given instructions for collecting six saliva samples. Cortisol levels were measured using assays from saliva that participants self-collected 3 times per day (immediately upon wake-up, 30 minutes after wake-up, and during the late afternoon) over two consecutive weekdays using saliva collection aids and pre-labeled cryovials. Participants were asked to refrain from brushing their teeth and consuming acidic/sugary food or beverages and dairy products prior to sample collection. Participants were instructed to freeze saliva vials immediately after collection and to record the time and date of each of their collections on a collection form. Families were visited three days later to collect their surveys and saliva, and to compensate them for their participation. All of their data were securely stored and deidentified to ensure participant privacy.

The second visit was conducted three days later when the research assistants returned to the participants' homes. They collected questionnaires and reviewed them privately and addressed any questions related to the items. Researchers also collected the saliva samples, Fitbits, and then paid participants and had them sign a payment receipt. This same two-visit protocol was followed one year later.

Measures

Parent-Child Acculturation Differences

To address the multidimensionality of acculturation, we considered values held strongly in many Latinx communities including familism and religion as well as more "mainstream" U.S. values that would not typically be valued highly by Latinx communities such as material success and independence/self-reliance. These data were extracted from the Mexican American Cultural Values Scale (MACVS; Knight et al., 2010) in pre-adolescents and their parents. The familism subscale of this measure consists of 16 items that are broken into three parts: "Familism-Support"; "Familism- Obligations"; and "Familism- Referent", which are acceptable as a composite score (Cronbach's alpha = .80 and above for adolescent, mother, and father reports). Items include statements such as, "Family provides a sense of security because they will always be there for you" and "Children should be taught to always be good because they represent the family". The religion subscale consists of 7 total items (Cronbach's alpha = .70 and above). Items include statements such as, "If everything is taken away, one still has their faith in God". The material success subscale consists of 5 items (Cronbach's alpha = .74 and above) that include statements such as, "Money is the key to happiness". Finally, the independence/self-reliance subscale consists of 5 items (Cronbach's alpha = .35 and above) with statements such as, "When there are problems in life, a person can only count on him/herself".

A 5-point Likert scale is used to measure extent of agreement with values and higher total scores of these subscales are associated with higher presence of familism and religion as cultural values. A total score for these subscales will be used to represent degree of acculturation, such that higher scores will reflect greater alignment with culture of origin values and therefore less acculturation to "mainstream" values in the U.S. A total score for the MACVS has good internal consistency (Cronbach's alpha = .80). and good construct validity and is correlated with other scales of ethnic identity, social support, parental monitoring, and religiosity. The MACVS has been validated for children as young as 11 years old and is meant to be used across the age-span.

The language factor subscale of the Acculturation Rating Scale for Mexican Americans-II (ARSMA-II; Cuellar et al., 1995) will be used to address another dimension of acculturation. The language subscale of the ARSMA-II comprises 8 items (e.g., "I speak Spanish" and "I enjoy Spanish language T.V."). The ARSMA-II as a complete scale contains 30 items that are grouped into two subscales: Mexican Orientation Subscale and Anglo Orientation Subscale. Both of these subscales have good internal reliabilities (Cronbach's alpha = .88 and .86, respectively). All of the language items had a strong factor loading, accounting for the most variance in both subscales. The results from the measure are meant to describe a continuum between these two domains where a lower score represents less acculturation to U.S. mainstream culture. Thus, lower scores on the 10-item language subscale represent more orientation to Spanish language than English language.

To analyze parent-child acculturation differences based off the measures mentioned above, a difference score of parent and child MACVS subscale composite scores and parent and child ARSMA-II language scores will be used to predict youth health outcomes.

Body Composition

BMI standard deviation scores (z-scores; zBMI) were used in our analysis because they are adjusted measurements of BMI for child/teen age and sex which provides better anthropometric data than BMI alone (Must & Anderson, 2006). Child BMI percentiles were calculated using the CDC's BMI Tool for Schools program (CDC, 2012), which uses growth charts adjusted for child age and sex. Waist circumference was also used as an outcome variable representing body composition because this measures visceral fat, an important correlate with adverse health outcomes related to increased adiposity (Ross et al., 2020). It is now encouraged in the obesity literature that researchers use additional measurement of body composition rather than only BMI, thus adding more nuance and better understanding to the impact of weight on overall health.

Sleep

The Fitbit Charge 2 with heart rate monitor was worn on the wrist to capture sleep behavior. Pre-adolescent objective sleep duration was determined based on an average of three nights of Fitbit data. Compared to polysomnography, Fitbit models correctly differentiated sleep from wake with accuracy values between .81 and .91 and sensitivity values between .87 and .99. Fitbit falls significantly short compared to polysomnography in specificity, showing values between .10 and .52. A validation study of the Fitbit Charge 2 by de Zambotti et al. (2017) indicated 0.96 sensitivity (accuracy to detect sleep) and 0.61 specificity (accuracy to detect wake) in an adult population. While more research in adolescents and children is necessary with these devices, preliminary research among adolescents has shown the Fitbit Charge 2 to measure sleep duration as well as a research actigraph (Kai Lee et al., 2019).

Sleep quality will also be assessed using the Pittsburgh Sleep Quality Index (PSQI, Buysse et al., 1989). The PSQI is a 19-item self-report questionnaire that assesses subjective

sleep quality and disturbances over the past month (see Appendix A). Scale scores (i.e., sleep quality, latency, duration, habitual sleep efficient, disturbances, use of sleeping medication, and daytime dysfunction) are summed to generate a global score. The PSQI has been shown to adequately distinguish "good" and "poor" sleepers (with 89.6% sensitivity and 86.5% specificity). Additionally, studies have shown the PSQI is highly correlated with other measures of sleep problems and sleep quality (Carpenter & Andrykowski, 1998). The total score was used in the current study as an outcome variable for sleep quality.

While the PSQI has primarily been used as an adult self-report, some studies have used it for children and adolescents as well (Duartes et al., 2014; Ertan et al., 2009). However, we have report on child sleep behaviors from mother and child, so these two reports will be averaged together to address the lack of psychometric validation of this measure in children. Research has suggested that parent report of child sleep behaviors may be more accurate than child self-report, although both tend to overestimate how much sleep the child gets (Combs et al., 2019).

Fitbit data and averaged mother and child report of child sleep based on the PSQI were used to represent dependent variables in our analyses. Specifically, Fitbit data represented sleep duration as an outcome variable, and the PSQI represented subjective sleep quality.

Stress

Salivary Cortisol. Cortisol levels were measured using assays from saliva that participants self-collected 3 times per day (immediately upon wake-up, 30 minutes after wake-up, and during the late afternoon) over two consecutive weekdays. The cortisol awakening response (CAR) derived from the six saliva samples from mothers, children, and participating fathers were used to represent a general measure of the stress response as a mediator between parent-child acculturation differences and child health outcomes. After the saliva vials were

collected from the participants, they were stored in SalivaBio Cryostorage boxes in freezers at −80 °F. Samples were shipped overnight in dry ice to the Institute for Interdisciplinary Salivary Bioscience Research for processing. All samples were assayed for salivary cortisol using a highly sensitive enzyme immunoassay (Salimetrics, State College, PA). The test used 25 mL of saliva and had a range of sensitivity from 0.007 to 3.0 mg/dL. The averages of intra- and inter-assay coefficients of variation were less than 10% and 15%, respectively. All samples were assayed in duplicate, and the average of the duplicates was used in all analyses. CAR was calculated using area under the curve with respect to increase (AUCi; Stalder et al., 2016) using only the waking and 30-minute post waking samples with the following equation:

$$\text{AUCi} = \left(\frac{Cortisol_{waking} + Cortisol_{30min}}{2} \right) \times (Time_{30min} - Time_{waking})$$
$$- \left(Cortisol_{waking} \times (Time_{30min} - Time_{waking}) \right).$$

Bicultural Stress. In order to represent the unique stressors of Latinx youth and parents beyond a more general measurement such as cortisol, the Multicultural Events Scale for Adolescents (MESA; Gonzales et al., 1995) and the Hispanic Stress Inventory (HSI; Cervantes et al., 2016) will be used for assessment of bicultural stress. Both of these measures require "yes/no" responses and a total number of "yes" responses will represent more or less bicultural stress. The MESA consists of 35 items with the following subscales included: Economic Stress, Peer Hassles, Family Conflict, and Language Conflict. The HSI consists of 25 items with the following subscales included: Occupational/Economic Stress, Marital Stress, and Immigration Stress.

The HSI has good internal consistency with Cronbach's alphas ranging from .77 to .91 (Cervantes et al., 2016). Construct validity was found to be acceptable as well. Total scores for the HSI correlate strongly with criterion measures of psychological distress. HSI has been used

to measure acculturative stress among Mexican Americans and higher scores are predictive of depression in this population (Cervantes et al., 2016). Items include statements such as, "Because of the lack of family unity, I have felt lonely and isolated" and "The pressures to achieve economic success have made me stop going to church." The HSI represented parent bicultural stress as a mediator of parent-child acculturation differences and youth health outcomes and in our analyses.

The MESA has been normed on English and Spanish speaking Mexican American adolescents (Gonzalez et al., 1995). The MESA has adequate test-retest reliability and concurrent validity. Internal consistency for the total score of the MESA ranges from .89 to .95 (Cooley-Strickland et al., 2011). Items include statements such as "A family member got upset at you for not participating in the family's cultural or religious traditions" and "You disagreed with family members because they wanted you to do things the Latino way." The MESA represented child bicultural stress as an additional mediator in our analyses.

Resilience

The Connor-Davidson Resilience Scale 10 (CD-RISC-10) is a 10-item scale developed and tested as a measure of resilience (Campbell-Sills & Stein, 2007). This measure has been validated in Spanish and with diverse populations. Items include: "I am able to adapt when changes occur" and "I can deal with whatever comes my way." Responses ranged from 1 = 'not true at all' to 5 = 'true nearly all the time', with higher scores indicating higher resilience. Internal consistency of this measure is good with a Cronbach's alpha of .85. Recent studies have shown reliability between .83 and .90. In demonstrating the validity of this measure, scores moderated the relationship between childhood maltreatment and psychiatric symptoms. Individuals who reported significant trauma and low resilience were highly symptomatic,

whereas individuals who reported significant trauma and high resilience have low levels of symptoms. An averaged total score was used in our analysis as a moderator between parent-child acculturation differences and health outcomes.

Ethnic Pride

Mexican American ethnic pride was measured using a 4-item scale developed by Thayer et al. (2002). The response format is a Likert-type scale ranging from 1 = *not at all true* to 5 = *very true* for the following statements: (1) You have a lot of pride in being Mexican; (2) you feel good about your Mexican background; (3) you like people to know that your family is Mexican or Mexican American; and (4) you feel proud to see Latino or Mexican actors, musicians, and artists being successful. Higher scores are indicative of greater pride in Mexican origin. Factor analysis of this measure confirmed that this construct was unidimensional (Cronbach's alpha = .81). In *La Familia,* a cultural studies project comprising two large samples of Mexican American families where this ethnic pride scale was administered (Roosa et al., 2008), Cronbach's alpha for teens was .63, .78 for mothers, and .77 for fathers. A total score from this measure was used as a moderator in our analysis.

Analytic Strategy

Our statistical analyses were conducted using Stata Version 16.

Aim 1

To verify whether there were differences in acculturation levels between parents and children in order to support an "acculturation difference" and to establish that acculturation increases over time.

Hypothesis 1a. To address our first hypothesis, we employed six independent sample t-tests between mother-child and father-child dyads to determine whether significant acculturation

differences existed in our data. Mother, father, and child language (ARMSA-II) and mother, father, and child cultural values (MACVS) scores from the first timepoint were analyzed as separate components of acculturation. Because a significant acculturation difference only emerged for the language measure of acculturation and not the cultural values measure, parent and child MACVS scores were used as separate predictors of child sleep and weight outcomes rather than as a difference score. Language acculturation was included as a difference score.

Hypothesis 1b. To examine the course of acculturation over time, mother, father, and child ARMSA-II scores and MACVS scores from timepoints one and two (one year apart) were compared using six paired sample t-tests. The Bonferroni correction was used to account for type one error.

Aim 2

To examine the impact of mother-child acculturation differences at timepoint one on child zBMI, waist circumference, sleep quality and duration at timepoint two.

Hypotheses 2a and 2b. To explore the impact of parent-child acculturation differences on child weight and sleep outcomes, a path analysis was used to test the effect of parent-child acculturation differences on child body composition and sleep. Two separate models were used to examine language and cultural values as separate contributors to the acculturative process. This model was set to predict our dependent variables (i.e., pre-adolescent sleep duration, sleep quality, and body fat calculation) at timepoint two. Covariates included socioeconomic status (annual income); pubertal development; single-parent status; parent time in the U.S.; and passage of time to account for the child being one year older at timepoint two.

Aim 3

To explore whether mother and child stress mediated the relationship between mother-child acculturation differences and adverse child health outcomes.

Hypothesis 3a and 3b. To explore our third hypotheses, we added mother and child bicultural stress and cortisol awakening response (CAR) to our path analysis model from aim 2, as this allowed us to test direct and indirect effects of our mediator with mother-child acculturation differences and child sleep and weight outcomes. Shrout and Bolger's (2002) steps for mediation were followed: (1) Estimate/test the bivariate X->Y path (2) Estimate the path from X->M. (3) Estimate the path from M->Y, with X-Y held constant. (4) Estimate the indirect X->M->Y path. (5) Estimate/test the X->Y path with M->Y held constant. (6) Assess the strength of mediation using effect ratios.

Aim 4

To explore possible child strengths that could mitigate the impact of stress and acculturation on adverse health outcomes.

Hypotheses 4a and 4b. To address our final hypotheses, we added pre-adolescent resilience and ethnic pride as moderators in our model. If stress emerges as a mediator in our prior analysis, the moderators will be added to this model, however, if stress does not pass the conditions of mediation, resilience and ethnic pride will be added to the initial model without stress included. Again, our independent variables were represented by the mother-child language acculturative differences and mother/child cultural values total scores and the dependent variables were pre-adolescent sleep duration, sleep quality, and body fatness (see Figure 1 for rendering of the final SEM model).

Aim 5

For this exploratory aim, all analyses were repeated with father data in place of mother data. Child health outcomes and covariates remained equal to primary analyses.

Figure 1

Structural Equation Model with Mediation and Moderation Effects
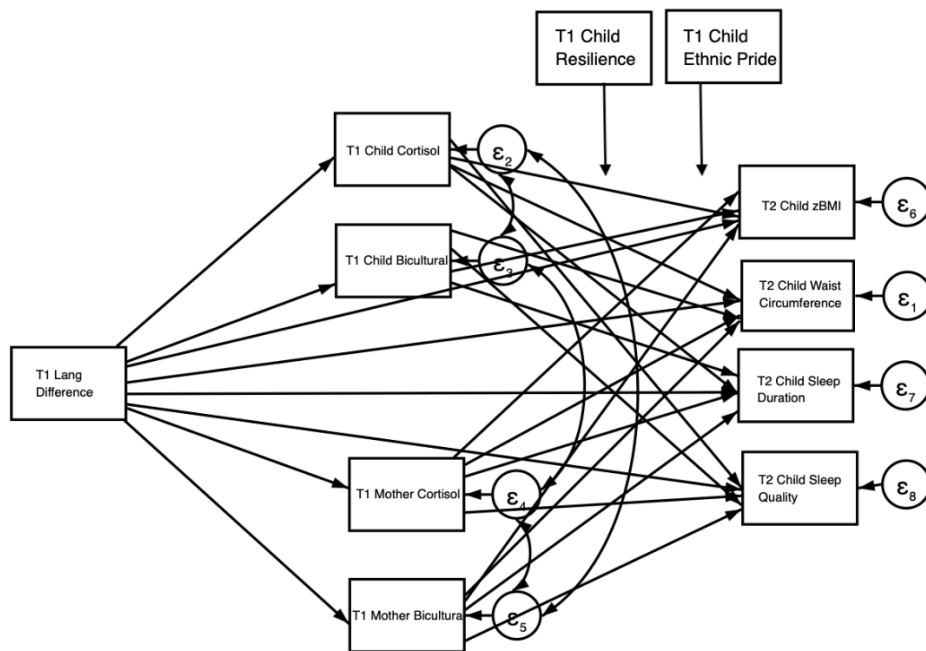
Note. A difference score between mother and child language acculturation scale at time one (T1) is the exogenous variable that predicted our mediators of parent and child bicultural and biological (cortisol) stress at T1 as well as our time 2 (T2) endogenous variables of child body fatness, sleep duration, and sleep quality. This model was duplicated, but the language acculturation variable was replaced with mother and child cultural values-based acculturation scores. An SEM approach, contrary to a regression analysis, allowed us to model error and asses for general model fit. Covariates (i.e., family income, single parent status, parent time living in the U.S., biological sex, and child pubertal development) were also included in our model.

Results

Before analyses were performed, the dataset was screened for missingness, outliers, and normality. Using Little's MCAR test in Stata, data were found to be missing completely at random ($\chi2(617, N = 119) = 670.3$, p = .07). Full information maximum likelihood (FIML; Lei & Wu, 2012) estimation was used to address missing data. This approach is statistically efficient and considered one of the best and simplest methods for dealing with data that is missing at random (MAR; Enders & Bandalos, 2001). Additionally, seven total outliers were discovered across the different variables of interest. Extreme scores (i.e., median +/- the interquartile range) for the subjects were recoded to the upper/lower limit of the range. Regarding measurement of normality, child zBMI at timepoint one and two were skewed to the right, indicating that our sample tended to have higher zBMI overall. We did not perform any transformations on this variable because it is generally representative of this population. All other variables did not show evidence of kurtosis, skewness, or non-normality according to Shapiro-Wilk tests.

Aim 1

The first aim was to assess whether there were differences in acculturation levels between parents and children and to examine how acculturation changes over the two timepoints for parents and children.

Hypothesis 1a

We hypothesized that parents would be less acculturated than their pre-adolescent child on both measures of acculturation. We expected this effect to hold at timepoint one and between timepoint one and two.

Parent vs. Child Language Differences. Children were significantly more oriented with the English language than their mothers at timepoint one and two ($t(236)=3.76$, $p<.001$; $t(200)2.32$, $p=.02$). At timepoint one, children were significantly more oriented with the English

language than participating fathers ($t(189)=3.48$, $p<.001$); however, the difference was not significant at timepoint two ($t(152)=1.11$, $p<.27$). At both timepoints, scores on language acculturation were higher for the children than the fathers.

Parent vs. Child Cultural Values Differences. There was no significant difference between mothers and children on measures of acculturation related to specific cultural values at timepoint one or two ($t(236)= -.17$, $p=.86$; $t(200)= -1.14$, $p=.25$). Similarly, no significant differences between fathers and children emerged at either timepoint ($t(189)=1.91$, $p=.06$; $t(152)=.95$, $p=34$).

Hypothesis 1b

We hypothesized that both parents and children would be more acculturated at timepoint two compared to their individual acculturative levels at timepoint one.

Child Acculturation. Children were similarly oriented with the English language at timepoint one as they were at timepoint two ($t(96)= .97$, $p=.33$). Regarding cultural values, children were significantly more acculturated to "mainstream" U.S. cultural values at timepoint two than at timepoint one ($t(96)= 3.43$, $p<.001$).

Mother Acculturation. Mothers did not become more strongly oriented with the English language between timepoints one and two ($t(96)= .97$, $p=.70$). Mothers became more acculturated at timepoint two to "mainstream" U.S. cultural values than timepoint one, but the difference did not meet statistical significance ($t(96)= 1.90$, $p=.06$).

Father Acculturation. Participating fathers did not become more strongly oriented with the English language between timepoints one and two ($t(42)= -1.08$, $p=.70$). They also did not show more acculturation to "mainstream" U.S. cultural values at timepoint two than timepoint one ($t(42)= -1.87$, $p=.07$). Notably, while mothers and fathers were similarly oriented to the

English language at each timepoint, fathers were, on average, more acculturated to "mainstream" U.S. values than mothers at timepoint one and two ($t(189)= 5.37$, $p<.001$).

Aim 2

Our second aim examined the impact of mother-child acculturation differences at timepoint one on child body composition characteristics and sleep quality and duration at timepoint two. From our first aim, language-specific acculturation between mother and child emerged as a significant difference and this difference score was used as a predictor for sleep and weight outcomes. Cultural value-specific acculturation was not significantly different between mother and child, so mother and child acculturation scores were used as separate predictors rather than as a difference score (Figure 2).

Hypothesis 2a

We hypothesized that as the language difference between mother-child acculturation increases, child body composition characteristics would increase both concurrently and longitudinally. Additionally, we hypothesized that as mother and child cultural values-specific acculturation scores increased, child body composition characteristics would increase.

Mother-Child Language Acculturation Differences. Concurrently, at timepoint one, the relationship between mother-child language differences and body composition characteristics (i.e., zBMI and waist circumference) did not emerge as significant. The covariates gender and pubertal status did significantly relate with the outcomes of interest. Being a boy was associated with a .34 increase in zBMI and a .27 increase in waist circumference, compared to being a girl ($p<.001$; $p=.002$). Higher pubertal status was also significantly associated with increased zBMI and waist circumference ($t(123=.29$, $p=.001$; $t(123)=.27$, $p=.002$).

Figure 2

Path Analysis Models for Aim 2
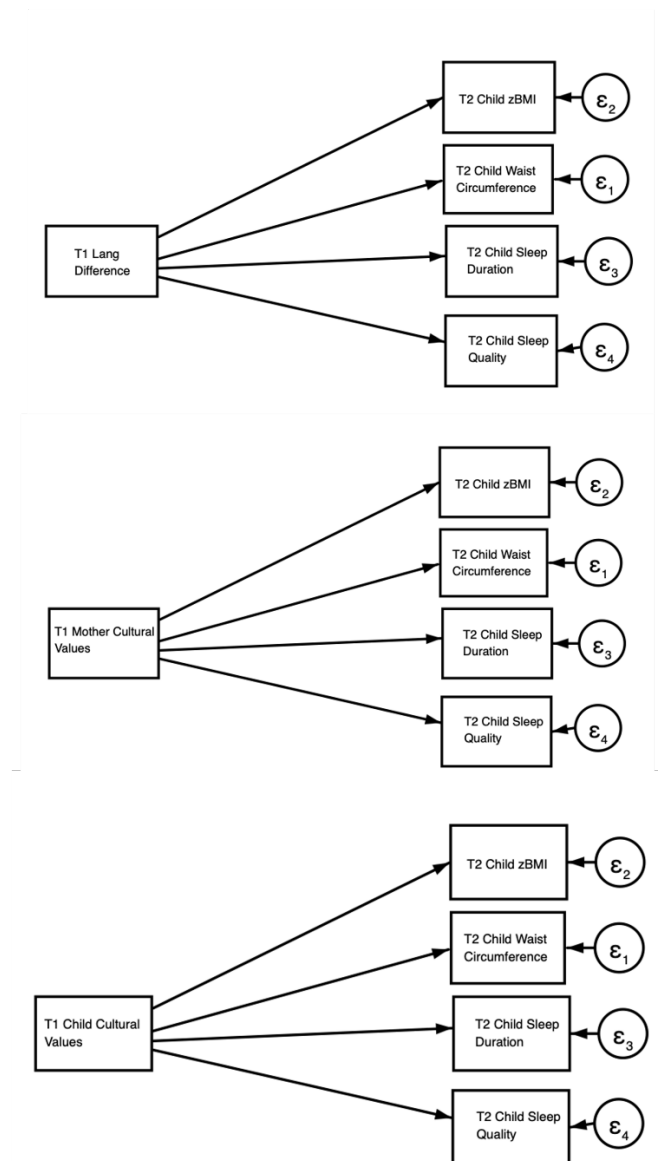
Note. Mother-child language-specific acculturation difference score was set to predict child health outcomes. Mother and child cultural values-specific acculturation scores were used as separate predictors instead of a parent-child difference because there was not a significant difference in our sample. Covariates (i.e., family income, single parent status, parent time living in the U.S., biological sex, and child pubertal development) were also included in each model.

Longitudinally, mother-child language differences and body composition characteristics did not emerge as significant (Table 2). Pubertal development at timepoint one remained a significant predictor of zBMI at timepoint two, but gender was no longer significant. Mothers' reported time in the U.S. at time one significantly predicted zBMI, such that more time in the U.S. was associated with higher child zBMI (t(123)=.04, p=.02). No predictors were significant for waist circumference.

Table 2

Prediction of Mother-Child Language Acculturation Difference on Child Health Outcomes at

Timepoint Two

Child Health Outcome	Coefficient	Standard Error	P-value	95%CI
zBMI				
Mother-child language difference	-.02	.7	.80	-.15, .11
Child biological sex	-.06	.07	.38	-.20, .08
Parent time in U.S.	.17*	.07	.02	.03, .30
Child pubertal status	.16*	.08	.04	.01, .32
Single parent status	.03	.08	.74	-.13, .18
Family income	.14	.12	.22	-.08, .35
Waist Circumference				
Mother-child language difference	.03	.04	.45	-.05, .11
Child biological sex	-.004	.04	.92	-.09, .08
Parent time in U.S.	.01	.05	.74	-.07, .10
Child pubertal status	.01	.05	.82	-.08, .10
Single parent status	.05	.05	.32	-.05, .15
Family income	.04	.06	.52	-.08, .16
Sleep Duration				
Mother-child language difference	.13	.13	.31	-.12, .38
Child biological sex	-.03	.14	.85	-.30, .25
Parent time in U.S.	-.05	.14	.74	-.33, .23
Child pubertal status	-.18	.16	.26	-.48, .13
Single parent status	-.30	.16	.70	-.62, .02
Family income	-.44*	.21	.04	-.85, -.03
PSQI Total Score				
Mother-child language difference	-.11	.10	.30	-.31, .10
Child biological sex	-.11	.11	.32	-.33, .11
Parent time in U.S.	.03	.11	.76	-.17, .24
Child pubertal status	-.16	.11	.15	-.37, .06
Single parent status	-.002	.12	.98	-.23, .23
Family income	.03	.14	.84	-.25, .31

*indicates p<.05

Mother-Child Cultural Values. Concurrently, the relationship between mother and

child cultural values-specific acculturation scores and body composition characteristics was not

significant. Again, puberty and being a boy emerged as significantly related to zBMI

($t(123)=.47$, $p=.003$; $t(123)=.59$, $p<.001$). and waist circumference ($t(123)=.09$, $p=.004$;

t(123)=.08, p=.005). Longitudinally, mother and child acculturation did not predict body composition characteristics (Table 3). Puberty and mother time in living the U.S. remained positively associated with zBMI.

Hypothesis 2b

We hypothesized that sleep duration would shorten, and self-reported sleep quality would worsen in association with a greater increase of parent-child acculturation differences and greater acculturation to "mainstream" U.S. values.

Mother-Child Language Acculturation Differences. There was no relationship between mother-child language difference scores and sleep outcomes concurrently or longitudinally (Table 2). Higher pubertal status was significantly associated with higher self-reported sleep quality concurrently but not longitudinally ((t(123)=3.24, p=.03; ((t(123)=-.07, p=.271).). No other covariates were significant.

Mother-Child Cultural Values. Concurrently, at timepoint one, child acculturation score predicted sleep duration, such that more alignment with culture of origin was associated with longer sleep duration (t(123)=1.52, p=.009). However, this relationship did not hold up between timepoint one and two (t(123)=-.002, p=.40; Table 3). Again, concurrently, higher pubertal status was associated with better self-reported sleep quality ((t(123)=3.2, p=.04), however this effect did not hold up longitudinally.

Table 3

Prediction of Mother and Child Cultural Values-Specific Acculturation on Child Health

Outcomes at Timepoint Two

Child Health Outcome	Coefficient	Standard Error	P-value	95%CI
zBMI				
Child Cultural Values	.01	.01	.08	-.001, .02
Mother Cultural Values	-.004	.01	.67	-.02, .01
Child biological sex	-.16	.18	.39	-.52, .20
Parent time in U.S.	.04*	.02	.01	.01, .07
Child pubertal status	.49*	.19	.01	.12, .87
Single parent status	.12	.29	.69	-.45, .69
Family income	.06	.05	.24	-.04, .16
Waist Circumference				
Child Cultural Values	-.04	.04	.39	-.12, .05
Mother Cultural Values	.06	.06	.30	-.05, .17
Child biological sex	-.06	1.29	.96	-2.59, 2.47
Parent time in U.S.	.04	.12	.70	-.19, .28
Child pubertal status	-.08	1.29	.95	-2.60, 2.44
Single parent status	2.04	2.00	.31	-1.89, 5.97
Family income	.20	.33	.54	-.45, .85
Sleep Duration				
Child Cultural Values	-.002	.003	.40	-.01, .003
Mother Cultural Values	.01	.003	.09	-.001, .01
Child biological sex	-.01	.06	.84	-.12, .10
Parent time in U.S.	-.002	.01	.65	-.01, .01
Child pubertal status	-.05	.06	.40	-.17, .07
Single parent status	-.15	.09	.12	-.33, .04
Family income	-.03	.02	.11	-.06, .01
PSQI Total Score				
Child Cultural Values	-.01	.05	.90	-.11, .10
Mother Cultural Values	.01	.07	.90	-.13, .15
Child biological sex	-1.38	1.63	.40	-4.56, 1.81
Parent time in U.S.	.07	.14	.60	-.20, .34
Child pubertal status	-2.18	1.54	.16	-5.20, .83
Single parent status	.03	2.42	.99	-4.72, 4.78
Family income	.22	.39	.58	-.55, .98

*indicates p<.05

Aim 3

Next, we aimed to explore whether mother and child stress mediated the relationship between parent-child acculturation differences and adverse child health outcomes. The final SEM models with language difference and mother/child acculturation as predictors, bicultural stress and cortisol awakening response as mediators, and zBMI, waist circumference, sleep duration, and sleep quality as dependent variables demonstrated overall acceptable model fit (RMSEA=.00, p=.63; Chi^2=3.46, p=.48).

Hypothesis 3a and 3b

We hypothesized that child and mother bicultural stress and CAR would mediate the relationship between mother-child acculturation differences and child sleep and body composition characteristics.

Stress Mediation. Mother-child language difference score was significantly related to mother report of bicultural stress, such that higher reported stress was associated with a smaller difference between mother and child language acculturation ((t(123)=-.25, p=.001, Table 4). Mother bicultural stress, however, did not relate with any of the health outcomes, and therefore did not emerge as a mediator. Living in a single-parent household was associated with an increase in child cortisol awakening response ((t(123)=85.25, p<.001). Child bicultural stress, mother and child cortisol awakening response did not relate with any of our outcomes.

Mother and child cultural value-specific acculturation was not associated with measures of child and mother stress. However, in this model, mother cultural value-specific acculturation at timepoint one predicted child sleep duration at timepoint two, such that mothers' greater alignment with culture of origin was associated with longer sleep duration in children one year later.

Table 4

Stress Mediation Analysis

	Coefficient	Standard Error	P-value	95%CI
Child Bicultural Stress				
Mother-child language difference	.004	.08	.96	-.15, .16
Child Cultural Values	-.03	.02	.17	-.07, .01
Mother Cultural Values	.02	.03	.44	-.04, .08
Child CAR				
Mother-child language difference	-.37	1.57	.81	-3.44, 2.70
Child Cultural Values	.74	.46	.10	-.15, 1.64
Mother Cultural Values	-.07	.64	.91	-1.34, 1.19
Mother Bicultural Stress				
Mother-child language difference	-.25*	.08	.001	-.40, -.10
Child Cultural Values	.02	.02	.47	-.03, .06
Mother Cultural Values	.06	.03	.05	-.001, .12
Mother CAR				
Mother-child language difference	1.34	1.94	.49	-2.47, 5.15
Child Cultural Values	-.22	.54	.68	-1.28, .84
Mother Cultural Values	-.61	.77	.43	-2.12, .90
Child Health Outcomes				
zBMI				
Child Bicultural Stress	-.05	.05	.32	-.15, .05
Child CAR	.001	.002	.45	-.002, .01
Mother Bicultural Stress	-.01	.04	.89	-.08, .07
Mother CAR	.00	.001	.99	-.003, .003
Waist Circumference				
Child Bicultural Stress	.23	.58	.69	-.90, 1.37
Child CAR	.004	.02	.84	-.04, .05
Mother Bicultural Stress	-.64	.43	.14	-1.48, .20
Mother CAR	-.02	.02	.24	-.05, .01
Sleep Duration				
Child Bicultural Stress	-.001	.01	.95	-.02, .02
Child CAR	.00	.001	.61	-.001, .001
Mother Bicultural Stress	.002	.01	.85	-.02, .02
Mother CAR	.00	.00	.88	-.001, .001
PSQI Total Score				
Child Bicultural Stress	.51	.31	.11	-.11, 1.12
Child CAR	.002	.01	.86	-.02, .03
Mother Bicultural Stress	.29	.25	.25	-.20, .77
Mother CAR	-.001	.01	.92	-.02, .02

*indicates p<.05

Aim 4

This aim explored possible child strengths such as resilience and ethnic pride that could mitigate the impact of acculturation on adverse health outcomes. Because stress did not emerge as a mediator in our previous aim, resilience and ethnic pride were considered as moderators of the impact of acculturation on health outcomes, omitting stress variables from the model. Ethnic pride and resilience were considered as separate predictors because their correlation did not exceed .70 (r=.13).

Hypothesis 4a

We hypothesized that resilience would moderate the association between mother-child acculturative differences/acculturation to "mainstream" U.S. values and adverse health outcomes.

Resilience and Mother-Child Language Acculturation Differences. After adding child resilience to this analysis, language acculturation differences between mother and child significantly predicted child waist circumference at timepoint two, such that a larger language difference was associated with increased waist circumference (t(123)=.59, p=.03; Table 5). Child resilience also interacted with mother-child language acculturation difference, such that the effect of language difference on waist circumference varied depending on different values of child resilience (t(123)=-.57, p=.03; Figure 3)

Table 5

Resilience Moderation

| Child Health Outcome	Coefficient	Standard Error	P-value	95%CI
zBMI				
Mother-child language difference	.16	.43	.71	-.68, .10
Resilience	.10	.12	.40	-.14, .34
Mother-child lang *Resilience	-.18	.43	.67	-1.02, .66
Child Cultural Values	-.09	.53	.86	-1.12, .94
Resilience	-.33	.88	.71	-2.07, 1.40
Child Cultural Values*Resilience	.44	1.08	.68	-1.68, 2.56
Mother Cultural Values	-.002	.05	.96	-.10, .09
Resilience	.01	.19	.96	-.36, .38
Mother Cultural Values*Resilience	7.59	.001	.99	-.003, .003
Waist Circumference				
Mother-child language difference	.59*	.27	.03	.07, 1.12
Resilience	.12	.08	.12	-.03, .27
Mother-child lang*Resilience	-.57*	.27	.03	-1.09, -.04
Child Cultural Values	.01	.33	.98	-.64, .66
Resilience	.05	.56	.93	-1.05, 1.15
Child Cultural Values*Resilience	-.08	.68	.91	-1.41, 1.26
Mother Cultural Values	.08	.33	.80	-.57, .74
Resilience	.08	1.29	.95	-2.45, 2.61
Mother Cultural Values*Resilience	-.001	.01	.92	-.02, .02
Sleep Duration				
Mother-child language difference	-1.93*	.76	.01	-3.43, -.44
Resilience	-.32	.24	.19	-.78, .15
Mother-child lang*Resilience	2.13*	.76	.01	.64, 3.63
Child Cultural Values	-2.59*	1.12	.02	-4.77, -.40
Resilience	-3.74	1.92	.052	-7.50, .03
Child Cultural Values*Resilience	4.94*	2.35	.04	.33, 9.55
Mother Cultural Values	.02	.01	.16	-.01, .05
Resilience	.07	.06	.24	-.04, .17
Mother Cultural Values*Resilience	-.0004	.0004	.29	-.001, .001
PSQI Total Score				
Mother-child language difference	.11	.71	.88	-1.28, 1.50
Resilience	-.09	.20	.67	-.47, .30
Mother-child lang*Resilience	-.23	.71	.74	-1.61, 1.15
Child Cultural Values	.58	.84	.49	-1.07, 2.22
Resilience	.79	1.43	.58	-2.02, 3.60
Child Cultural Values*Resilience	-1.13	1.74	.52	-4.54, 2.28
Mother Cultural Values	-.05	.42	.90	-.87, .77
Resilience	-.34	1.62	.84	-3.51, 2.84
Mother Cultural Values*Resilience	.002	.01	.89	-.02, .03

*indicates p<.05

Figure 3

Moderation of Resilience on Relationship Between Mother-Child Language Difference and

Child Waist Circumference
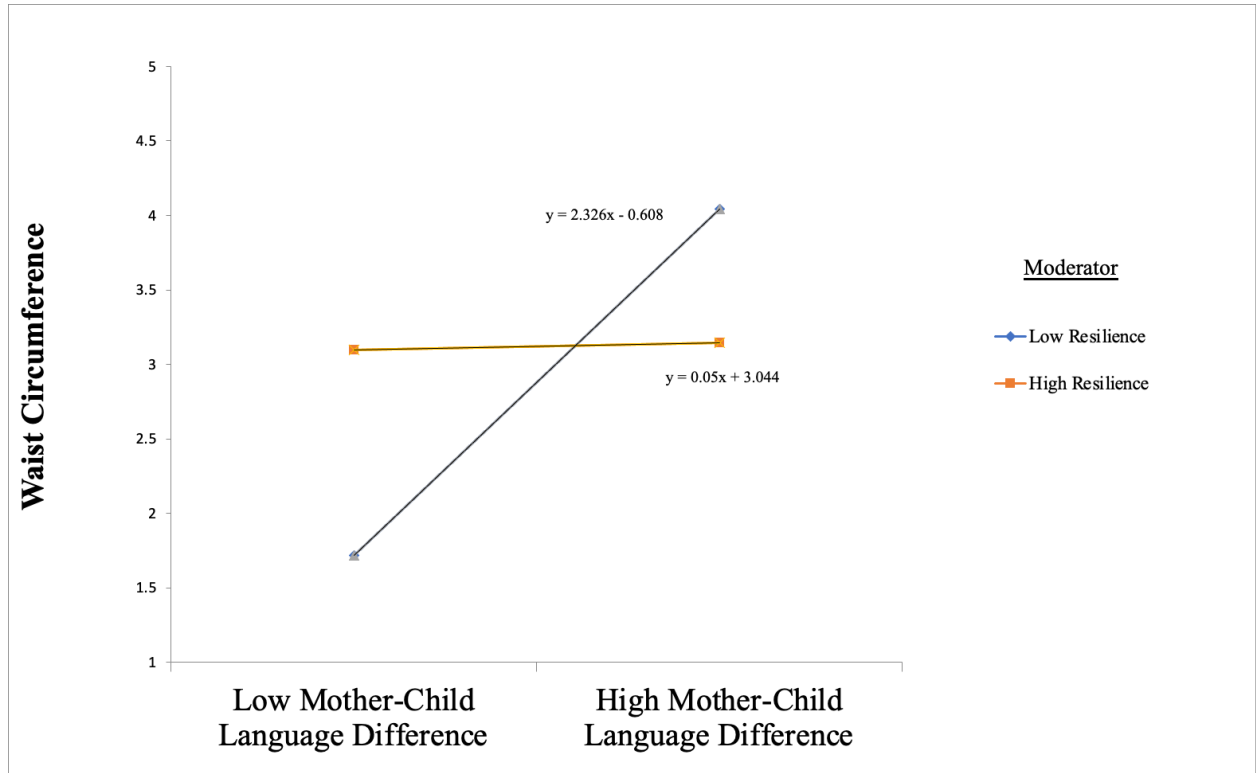
Additionally, mother-child language difference predicted child sleep duration at

timepoint two, such that increase in sleep duration was associated with a decrease in language

difference between mother and child (*t*(123)=-1.93, *p*=.01). Additionally, resilience interacted

with language difference, such that the effect of language difference on sleep duration varied

depending on the different levels of child resilience (*t*(123)=2.13, *p*=.005; Figure 4). The

covariate income also significantly predicted sleep duration in this analysis, such that increase in

child sleep duration was associated with lower parental income (*t*(123)=-.54, *p*=.002).

Figure 4

Moderation of Resilience on Relationship Between Mother-Child Language Difference and

Child Sleep Duration
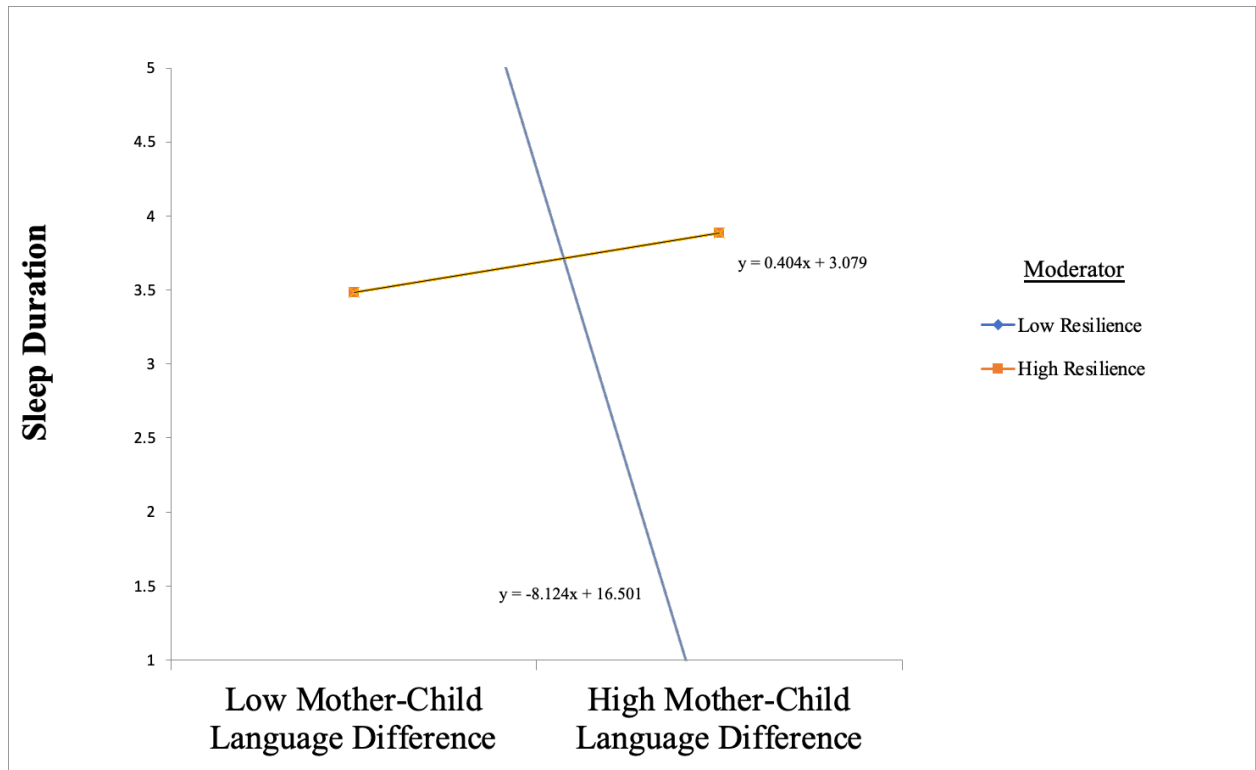
Resilience and Mother-Child Cultural Values. After adding child resilience to this analysis, child cultural values-specific acculturation predicted child sleep duration at timepoint two, such that the more aligned the child was "mainstream" U.S. values, the longer their sleep duration ($t(123)=-2.59$, $p=.02$). Child resilience interacted with child cultural values-specific acculturation score, such that the effect of child acculturation on sleep duration varied depending on different values of child resilience ($t(123)=4.93$, $p=.04$; Figure 5). Mother cultural value-specific acculturation level did not significantly predict any of our outcomes and did not interact with child resilience.

Figure 5

Moderation of Resilience on Relationship Between Child Cultural-Values Specific

Acculturation and Child Sleep Duration
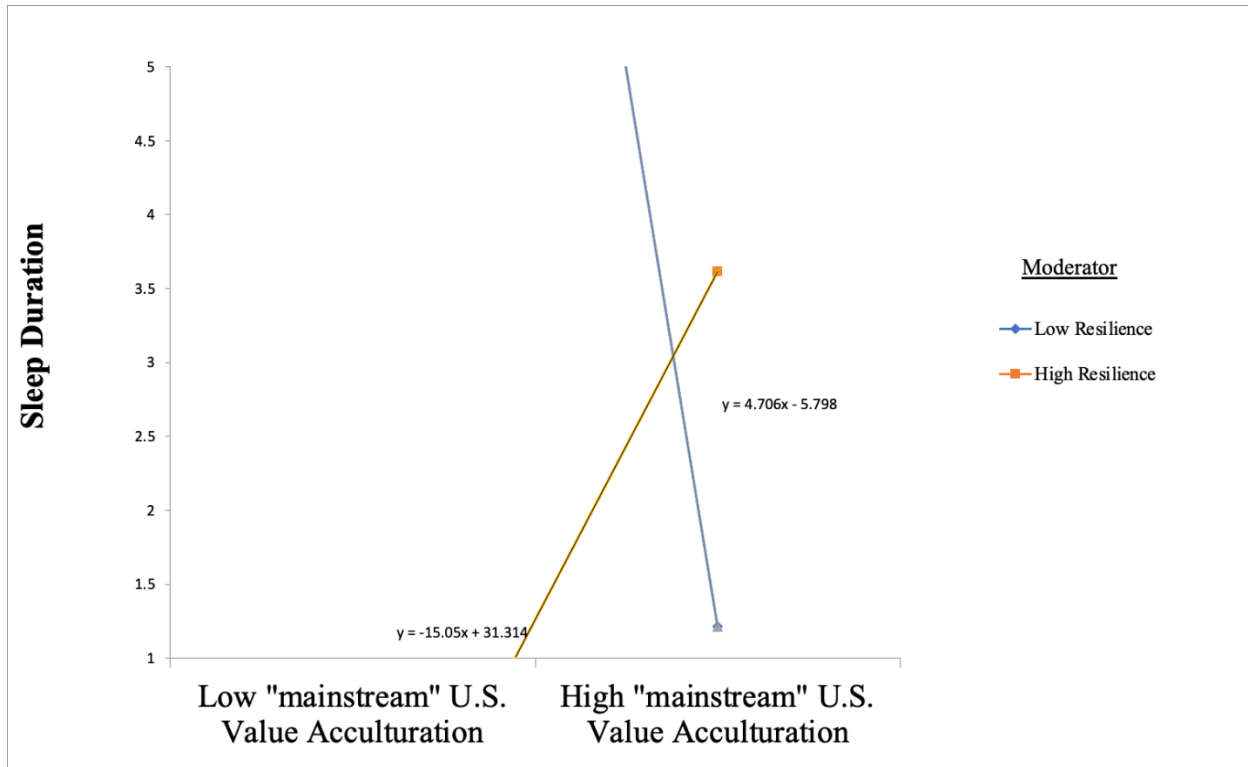
Hypothesis 4b

We hypothesized that ethnic pride would moderate the association between mother-child

acculturative differences/acculturation to "mainstream" U.S. values and adverse child health

outcomes.

Ethnic Pride and Mother-Child Acculturation. Mother-child language acculturation

differences did not interact with ethnic pride to predict any health outcomes (Table 6). However,

child cultural value-specific acculturation did interact with ethnic pride to predict zBMI at

timepoint two ($t(123)=2.53$, $p=03$; Figure 6). Child ethnic pride also predicted child zBMI, such

that higher zBMI was associated with lower ethnic pride ($t(123)=-1.89$, $p=.03$). Mother cultural
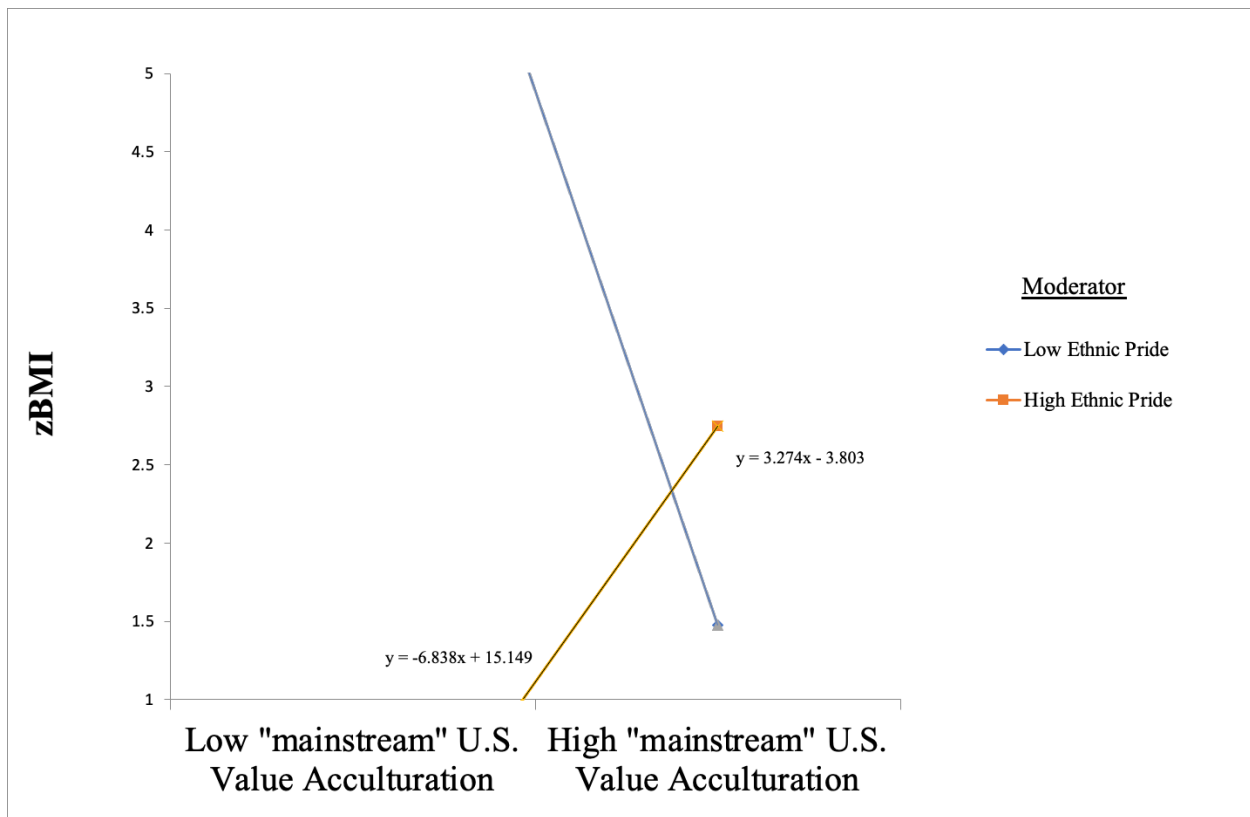
value-specific acculturation did not interact with ethnic pride or significantly predict any health outcomes.

Aim 5

Our final aim was an exploratory aim to consider the possible relationship of father-child language acculturation differences and cultural value-specific acculturation on adverse health outcomes.

Figure 6

Moderation of Ethnic Pride on Relationship Between Child Cultural-Values Specific Acculturation and Child zBMI

Father-Child Acculturation and Child Health Outcomes. Results examining fathers were broadly similar to primary analyses with mothers. However, some differences did emerge. Father's cultural value-specific acculturation at timepoint one predicted child zBMI at timepoint two, such that higher child zBMI was associated with fathers' greater alignment to culture of origin ($t(123)=.18$, $p=.03$). Fathers' bicultural stress and CAR did not act as mediators between acculturative relationships, however fathers' CAR response did predict child waist circumference ($t(123)=-4.9$, $p<.001$). In the analyses including measurement of stress, fathers' bicultural stress and CAR positively predicted child zBMI ($t(123)=.15$, $p=.04$; $t(123)=-.21$, $p=.04$). Fathers that were more aligned with their culture of origin were associated with increased paternal bicultural stress ($t(123)=.30$, $p=.009$). Children that were more aligned with their culture of origin were positively associated with fathers' CAR response ($t(123)=.34$, $p=.01$). Father-child language difference and father cultural value-specific acculturation did not interact with child resilience or ethnic pride to impact outcomes.

Table 6

Ethnic Pride Moderation

Child Health Outcome	Coefficient	Standard Error	P-value	95%CI
zBMI				
Mother-child language difference	.73	.41	.08	-.08, 1.53
Ethnic Pride	.20	.13	.12	-.05, .46
Mother-child lang *Ethnic Pride	-.80	.44	.07	-1.66, .06
Child Cultural Values	-.89	.47	.06	-1.82, .03
Ethnic Pride	-1.89*	.85	.03	-3.55, -.23
Child Cultural Values*Ethnic Pride	2.53*	1.15	.03	.27, 4.79
Mother Cultural Values	-.57	.40	.16	-1.34, .21
Ethnic Pride	-1.37	.92	.14	-3.18, .43
Mother Cultural Values*Ethnic Pride	1.49	.98	.13	-.44, 3.42
Waist Circumference				
Mother-child language difference	.24	.25	.33	-.25, .74
Ethnic Pride	-.02	.08	.83	-.18, .14
Mother-child lang *Ethnic Pride	-.23	.27	.40	-.75, .30
Child Cultural Values	-.02	.31	.94	-.63, .59
Ethnic Pride	-.10	.56	.85	-1.20, .99
Child Cultural Values*Ethnic Pride	.06	.76	.93	-1.43, 1.55
Mother Cultural Values	-.13	.25	.60	-.61, .35
Ethnic Pride	-.45	.57	.43	-.78, 1.62
Mother Cultural Values*Ethnic Pride	.42	.61	.49	-.78, 1.62
Sleep Duration				
Mother-child language difference	-1.05	.82	.20	-2.67, .56
Ethnic Pride	-.56*	.27	.04	-1.08, -.03
Mother-child lang *Ethnic Pride	1.38	.89	.12	-.36, 3.11
Child Cultural Values	-.92	1.10	.40	-3.89, 1.24
Ethnic Pride	-1.71	2.08	.41	-5.79, 2.36
Child Cultural Values*Ethnic Pride	2.16	2.83	.45	-3.40, 7.71
Mother Cultural Values	.85	.91	.35	-.94, 2.64
Ethnic Pride	1.29	2.11	.54	-2.85, 5.43
Mother Cultural Values*Ethnic Pride	-1.47	2.26	.52	-5.91, 2.96
PSQI Total Score				
Mother-child language difference	-.15	.65	.82	-1.41, 1.12
Ethnic Pride	-.14	.23	.52	-.59, .30
Mother-child lang *Ethnic Pride	.08	.70	.91	-1.28, 1.44
Child Cultural Values	-.66	.87	.45	-2.37, 1.05
Ethnic Pride	-1.45	1.58	.36	-4.55, 1.65
Child Cultural Values*Ethnic Pride	1.74	2.13	.41	-2.43, 5.92
Mother Cultural Values	-.30	.63	.64	-1.54, .94
Ethnic Pride	-.84	1.49	.57	-3.75, 2.08
Mother Cultural Values*Ethnic Pride	.75	1.58	.64	-2.34, 3.83

*indicates p<.05

Discussion

The present study sought to examine the relationship between parent and child acculturation and weight and sleep health outcomes among Latinx children. To address gaps in previous research, the current study used more detailed measures of acculturation and explored stress as a possible mediator. Moreover, child resilience and ethnic pride were examined as possible protective factors from the effects of acculturation and related stress on child health outcomes. We hypothesized that significant differences in acculturation would exist between parents and children such that children would be more acculturated toward English language and "mainstream" U.S. values than their parents and that parents and children would be more acculturated at timepoint two than timepoint one. Additionally, we hypothesized that greater acculturative differences between child and parent would predict worse child weight and sleep outcomes. Higher levels of acculturation to "mainstream" U.S. values were hypothesized to predict worse child health outcomes. Stress specific to parent and child cultural experiences and parent and child cortisol awakening response (CAR) was hypothesized as the primary mediator between these variables. Lastly, child resilience and ethnic pride were hypothesized to dampen the relationship between acculturation and negative health outcomes and act as protective factors. We will now discuss the results from our analyses and how they compare to the extant literature available on this and related topics.

Child and Parent Acculturation

Regarding acculturative status in our sample, children were only significantly different from their parents on the language-specific measure of acculturation and not the cultural values-specific measure of acculturation. At both timepoints, children were more oriented to the English language than their parents and, despite being more oriented towards "mainstream" U.S. values

than cultural values of origin, children were not significantly more acculturated than their parents on this measure at either timepoint. Another study that examined parent-child acculturation differences used a language measure of acculturation and also found a significant difference; however, additional measures of culture-specific factors beyond language were not included (Pasch et al., 2006).

Analysis of acculturation over time revealed that children were significantly more acculturated to "mainstream" U.S. values between timepoint one and two, which was consistent with our hypothesis. However, parents did not become significantly more acculturated after one year. One year may not be long enough to capture significant change in acculturation among adult Latinxs in the U.S., especially compared to children who are often thought to be in an accelerated acculturative process through the public school system (Fuligni, 2001). Notably, the vast majority parents in our sample were first-generation immigrants from Mexico, with the averaged amount of time living in the U.S. being 16.44 (SD=5.59) years. It is possible that parents reach a plateau in their acculturation after a certain number of years living in the U.S., however, longitudinal analysis of the acculturative process is lacking in the literature. Our sample also showed fathers were more acculturated to "mainstream" U.S. values than mothers at both timepoints, possibly influenced by fathers' increased involvement in work outside of the home (Marquez & McAuley, 2006). A previous study showed that the relationship between acculturation and health outcomes is more pronounced in adult men than women (Gorman et al., 2010), suggesting a possible impact of gender on Latinx adult acculturation factors. Differences between acculturation within partnerships specifically could be a valuable focus of future research but is outside the scope of the current study.

Acculturation, Child Health Outcomes, and Protective Factors

In the present study, child sleep and body composition characteristics were the primary outcomes of interest. Parent-child acculturation levels and acculturative differences were our primary predictor variables, and the following were included as covariates in all analyses: child puberal status, child biological sex, single-parent status, mothers' time living in the U.S., and family income. The relationships between our variables were analyzed through a series of structural equation models. In initial models, mother-child language difference did not significantly predict child health outcomes and stress did not emerge as a mediator. The most consistent predictors of child zBMI across models were child pubertal status and number of years parent has been living in the U.S. Both variables had positive correlations with zBMI concurrently and longitudinally. There were no significant predictors of waist circumference, sleep duration, or sleep quality.

Despite the current study's efforts to evaluate acculturation as a multidimensional construct, it appears that time in the U.S. was the strongest overall predictor of increased child zBMI, which is in accordance with other studies that have used this variable to examine health outcomes (Kosack & Ward, 2020). Acculturative experiences specific to health behaviors learned in the U.S. over time, food insecurity, and social/environmental changes in eating practices could be a level of specificity that would speak meaningfully to the literature and inform interventions. Past research on these topics has assumed that pre-immigration diets or non-U.S. diets are inherently healthier, but this greatly oversimplifies the issue. Martínez (2020) suggested that the following points should be considered if researchers are to assess dietary acculturation in a way that expands understanding of Latinx dietary change and obesity disparities:

(1) consider and measure Latinx persons' pre-immigration experiences, (2) create

theoretically informed research that captures the complex process of dietary and

foodways transformations, (3) document and compare the two or more cultures that are

influencing one another, (4) conduct longitudinal studies that capture dietary changes

throughout the life course, and (5) consider Latinx persons' context and modes of

incorporation. (p. 336)

These points are valuable to consider in the context of dietary acculturation but also in the

acculturative process more broadly. Assumptions and biases related to differing cultures need to

be challenged and directly addressed. Understanding the individual contexts and strengths of any

group of people can help promote better health and inform interventions. The current study

aimed to speak to some of this nuance by including bidimensional measures of acculturation and

focusing on cultural and individual strengths, which added meaningfully to our analyses. Despite

the lack of significance between acculturation variables and child health outcomes in initial

analyses, results changed once child resilience and ethnic pride were added to the models and

merit further discussion.

Resilience. In analyses that included our moderators, mother-child language difference

became a significant predictor of child waist circumference and sleep duration, and child

resilience moderated these effects. Greater mother-child language difference predicted higher

child waist circumference at timepoint two, but resilience dampened the strength of this

relationship. This would suggest that increased child resilience could act as a protective factor

between mother-child language difference and waist circumference a year later, holding constant

family income, single-parent status, child biological sex, child pubertal status, parent time living

in the U.S., and child waist circumference at timepoint one. In the broader research on resilience

and weight factors among children, resilience has been shown to be a protective factor against childhood obesity and is associated with lower adiposity (Li et al., 2022; Foster & Weinstein, 2019).

In our study, mother-child language difference and its interaction with child resilience were only associated with waist circumference and not zBMI. Waist circumference and zBMI were strongly correlated at timepoint one and two in our sample (r=.89, p<.001; r=.79, p<.001), but measuring them both might allow for better understanding of child health. Despite their high correlation, waist circumference has been found to relate to higher blood pressure even when BMI is considered "normal" (Pazin et al., 2017). Waist circumference is overall a better predictor of cardiovascular disease factors in children than BMI alone (Savva et al., 2000).

Regarding child sleep duration, our results showed a greater mother-child language difference predicted shorter child sleep duration at timepoint two. Child resilience acted as a moderator and dampened the negative relationship between these variables. Additionally, child culture-specific acculturation also predicted sleep duration such that higher alignment with the child's culture of origin values predicted decreased sleep duration, a result that was contrary to our hypotheses. Again, child resilience dampened the strength of this relationship. While sleep disparities are clear among minoritized youth in the U.S. (Whinnery et al., 2014), the role of acculturation on sleep outcomes among Latinx youth has not been widely explored in the literature. A recent study examining sleep among Latinx adults in the U.S. found "Anglo acculturation" was associated with shorter weekend sleep duration and efficiency and worse severity of insomnia, sleep quality, and sleep apnea risk (Ghani et al., 2020), which was the opposite direction of influence that our results would suggest. Granted, direct comparisons cannot be made with the current study which was conducted with children. Despite these

disparate findings, our findings would still support resilience as a protective factor against adverse sleep outcomes in Latinx youth.

Martinez-Miller et al. (2019) found results with the same directionality related to sleep and acculturation as we saw in the current study, however it was also with an adult population. Higher "U.S. acculturation" was associated with better sleep among older, lower socioeconomic Latinxs, but with shorter sleep duration among middle-aged, higher socioeconomic Latinxs. These recent studies show the disparities that remain present in the literature related to acculturation and sleep factors among Latinxs. More research is required to understand this relationship, especially among young people; however, utilizing individual strengths such as resilience and ethnic pride could be a valuable focus of action regardless. Moreover, the relationship between youth sleep outcomes and parent-child acculturative differences has yet to be explored, to our knowledge, and this research adds to the sleep and acculturation literature with a novel approach.

Ethnic Pride. After adding child ethnic pride to our analysis, child cultural value-specific acculturation interacted with ethnic pride to predict child zBMI at timepoint two. Child ethnic pride dampened the negative relationship between child cultural value-specific acculturation and zBMI. Moreover, higher ethnic pride predicted lower child zBMI. This would support our hypothesis that ethnic pride acts as a protective factor against higher child weight status, however ethnic pride did not interact with or predict any other health outcomes. Some support exists in the literature for the findings in our study. Ethnic pride has been presumed as a protective factor against the development of obesity in minoritized youth in the U.S. (Browne et al., 2022). Factors such as racism and discrimination are thought to impede the retention and development of ethnic pride among young people and cause self-esteem and other psychosocial

concerns (Dulin-Keita et al., 2011). Our results would suggest that disruptions to ethnic pride can also have an impact on physical wellbeing, however the mechanism of action remains unknown. It is possible that ethnic pride allows for integration, the favorable acculturation strategy which involves a balanced melding of multiple cultures (Yoo, 2021, Berry, 2005). In general, children seem to benefit from an integration of family culture of origin and identity as it relates to the greater community of which they are part (Nelson et al., 2018); however, if their greater community is not supportive of their unique cultural background, this can result in significant concern. Strengths-based research among marginalized groups is crucial as it points towards culturally competent interventions and solutions.

Stress and Acculturation

The current study also sought to examine parent and child stress as a mediator of the relationship between acculturation and parent-child acculturative differences and child sleep and weight outcomes. The mechanisms of action of acculturation on health outcomes, especially among children, has not been explored. We examined parent and child culture-specific stress through self-report as well as CAR data to provide a more "objective" measure of stress in our sample. However, in our sample, these stress variables did not mediate the relationship between our variables of interest. However, mothers' greater alignment to culture of origin did predict longer sleep duration in children one year later in our model that included stress variables. Additionally, mother report of bicultural stress and mother-child language difference were significantly related, but not in the direction we hypothesized. Greater bicultural stress was associated with a smaller language gap between mother and child, rather than a larger gap. While speculative, this could be related to the stress a parent may have related to their child struggling with learning deficits in school due to language barriers. In many cases, parents also rely on their

children to help them navigate language barriers in day-to-day life due to the general lack of resources for Spanish speakers in the U.S. (Martinez Jr. et al., 2009). This phenomenon is referred to broadly as "language brokering" (Morales & Hanson, 2005). Thus, if the language proficiency is similar between mother and child and clear translation is not readily available, this could create added cultural stress (Corona et al., 2011).

The acculturative experience is distinct for every family and individual and can be positive or negative depending on many factors. Generally speaking, a healthy melding of both culture of origin and "mainstream" U.S. values would be ideal for many (Van Der Zee & Oudenhoven, 2016). Specifically, it is thought the stress involved in acculturation makes the difference between negative and positive outcomes. Available research has found acculturative stress to mediate relationships in Latinx adults and adolescents between acculturation and psychological distress (Torres et al., 2012; Smokowski et al., 2009). A recent study found that acculturative stress among Latinx adults had a direct effect on perceived physical health and was mediated by reported anxiety (Cariello et al., 2020). While our study did not find that stress mediated the relationship between acculturation/parent-child acculturative differences and child sleep and weight outcomes, our measures of stress did relate meaningful with some variables.

Father-Child Exploratory Analysis. Our exploratory analyses between fathers and children did not yield significant results related to father-child language differences or father acculturation and child sleep and weight outcomes. However, it differed the most from our mother-child analyses in relation to our stress variables. Firstly, in the father-child analyses that included stress variables, the father being more aligned with his culture of origin predicted higher child zBMI, which was not in the direction that we originally hypothesized. Moreover, higher report of paternal bicultural stress predicted higher child zBMI, which is more in line with

the direction of correlation that we theorized. Interestingly, fathers that were more aligned with their culture of origin also tended to experience more bicultural stress, suggesting that less acculturation may not be as beneficial when this is also associated with greater stressors such as discrimination and social prejudice.

Fathers' CAR was negatively associated with child waist circumference and child zBMI in our sample, but child's CAR did not relate with any health outcomes in our analyses. An increase in father's CAR was associated with their child being more aligned with their culture of origin. Low CAR and high CAR have both been linked to an imbalance in adrenal hormones and dysregulation of the HPA axis after exposure to chronic stress and increased allostatic load (Steptoe, 2016). CAR profiles are being measured and analyzed more commonly in research as biomarkers for chronic stress, but it is still not very well understood. Related to the current study, one study found CAR to mediate the relationship between acculturative stress and self-reported health status among Mexican American adults (Garcia et al., 2017). This study found diminished CAR to be the primary profile for the mediation. However, the relationship between Latinx parent CAR and child acculturation and health outcomes has not been examined previously. The Family Stress Model theorizes that parental stress can affect the physical and emotional wellbeing of the children, and evidence has supported the legitimacy of this theory across multiple ethnic groups (Masarik & Conger, 2017). Despite the importance of understanding the family as a whole, research thus far has focused primarily on the mother-child dynamic. This study attempted to add to the literature by including another caregiver perspective (i.e., fathers). This is especially valuable in the context of Latinx-focused research as they generally place great value on family relationships and prioritizing family over the self (Corona et al., 2017).

The results from our primary and exploratory analyses would suggest some interplay between parent stress and child health and acculturative factors; however, in our sample, stress did not have the causal effect that we hypothesized. With two timepoints separated by one year, it is possible that our study design was not able to appropriately capture this relationship. More research is necessary to better understand the family dynamics of stress, acculturation, and child health, especially as they relate to biomarkers such as CAR.

Limitations

This study is not without limitations. Firstly, acculturation is a complex construct that leaves room for inconsistent research findings and biased interpretations. Hunt et al. (2004) called attention to some of the inherent issues of studying acculturation that should be noted here. First, acculturation is not simply two separate cultures, one "against" the other. There is substantial nuance between and within cultures that cannot be easily represented in experimental research. Moreover, the current study is comprised of mostly Mexican American families living in rural Indiana. Thus, the results of this study cannot be generalized to all Latinxs in the U.S. and all interpretations of results should include thoughtful, cultural understanding and should not attempt to "lump" a diverse ethnic group together as a monolith.

Moreover, despite the current study's attempt to address issues of methodological rigor found in past research on acculturation, there are important flaws to consider. First, our sample size, especially in our exploratory analyses with fathers, is relatively small. Thus, there is a possibility of type two error, making it difficult to interpret our results. Also, despite the strength of using two timepoints to examine our hypotheses rather than a cross-sectional design, longitudinal studies over several timepoints are still necessary in future studies on this topic, especially for exploring causal factors. Ideally, data for our mediator of stress would be collected

at a timepoint after the initial visit and before the final visit to better represent this effect. It should also be noted that our study has no control group for comparison, which could more robustly address the health disparities present in this population. Additionally, we did not assess for health-related behaviors present among these families before their time in the U.S. Chronicity of the acculturative process from before contact with a new culture to years beyond is essential for understanding the true impact of acculturation on health outcomes.

Potential Implications

Despite the shortcomings of this study, there are certainly important potential implications for clinical practice, advocacy, and prevention. According to the American Psychological Association, psychologists should "recognize that fairness and justice entitle all persons to access to and benefit from the contributions of psychology and to equal quality in the processes, procedures, and services being conducted by psychologists" (APA, 2017). Research specific to diverse populations is crucial in promoting equality and equity in psychological clinical practice and research. In psychological research, ethnic, racial, and cultural diversity is lacking, with the majority of research being conducted with white people and by white people (Roberts et al., 2020).

Moreover, this is the first study to explore the relationship between parent-child acculturation differences and child sleep outcomes. Additionally, a strengths-based approach in experimental research, beyond simply acknowledging certain disparities, is crucial in serving these populations. Health interventions could include promotion of ethnic identity and pride within youth and promoting healthy integration into "mainstream" U.S. culture among Latinx families. For example, one study found that tailoring an intervention for increased fruit and vegetable consumption to ethnic identity in African American adults promoted this health

behavior (Resnicow et al., 2009). Focusing on strengths rather than deficits could help promote better overall health outcomes for these youth and increase acceptance of different cultures in the U.S. Moreover, research that includes thoughtful consideration of the stressors and challenges present among Latinx families can shed light on the problem at hand and provide rationale for better resources and opportunities for Latinxs in the U.S.

Furthermore, while acculturation is not new to the psychology research world, many methodological issues have been noted in current literature (McLeod et al., 2016). This includes lack of comprehensive measures of acculturation, cross-sectional designs, and lack of mediation/moderation models. Additionally, research examining the impact of acculturation in the context of the parent/child relationship (i.e., parent-child acculturation differences) on sleep and weight outcomes has not been explored. The current study attempted to address these shortcomings and gaps in the literature.

Conclusion

Results from our study highlight the importance of cultivating individual strengths and understanding personal context of Latinx youth to help promote better health and inform interventions. This study was not able to identify stress as a mediator of the impact of acculturation and parent-child acculturation differences on pre-adolescent health outcomes; however, regardless, our study demonstrated the value of strengths-based considerations in research on health outcomes in youth. The aim of this research should not be to simply point out deficits, but to identify strengths and then draw from those strengths to improve interventions. It should also be noted that broader sociopolitical change is necessary to better address health disparities and improve the lives of marginalized groups.

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Appendix A

PITTSBURGH SLEEP QUALITY INDEX (PSQI)

INSTRUCTIONS: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

1. During the past month, when have you usually gone to bed at night?

   USUAL BED TIME_____

2. During the past month, how long (in minutes) has it usually take you to fall asleep each night?

   NUMBER OF MINUTES_____

3. During the past month, when have you usually gotten up in the morning?

   USUAL GETTING UP TIME_____

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spend in bed.)

   HOURS OF SLEEP PER NIGHT_____

INSTRUCTIONS: For each of the remaining questions, check the one best response. Please answer all questions.

5. During the past month, how often have you had trouble sleeping because you...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
(a) ...cannot get to sleep within 30 minutes	☐	☐	☐	☐
(b) ...wake up in the middle of the night or early morning	☐	☐	☐	☐
(c) ...have to get up to use the bathroom	☐	☐	☐	☐
(d ...cannot breathe comfortably	☐	☐	☐	☐
(e) ...cough or snore loudly	☐	☐	☐	☐
(f) ...feel too cold	☐	☐	☐	☐
(g) ...feel too hot	☐	☐	☐	☐
(h) ...had bad dreams	☐	☐	☐	☐
(i) ...have pain	☐	☐	☐	☐

(j) Other reason(s), please describe

_____

_____

How often during the past month have you had trouble sleeping because of this?	☐	☐	☐	☐

	Very good	Fairly good	Fairly bad	very bad
6. During the past month, how would you rate your sleep quality overall?	☐	☐	☐	☐

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
7. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?	☐	☐	☐	☐
8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	☐	☐	☐	☐

	No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	☐	☐	☐	☐

	No bed partner or roommate	Partner/ roommate in other room	Partner in same room, but not same bed	Partner in same bed
10. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	☐	☐	☐	☐

If you have a roommate or bed partner, ask him/her how often in the past month you have had...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
(a) ...loud snoring	☐	☐	☐	☐
(b) ...long pauses between breaths while asleep	☐	☐	☐	☐
(c) ...legs twitching or jerking while you sleep	☐	☐	☐	☐
(d) ...episodes of disorientation or confusion during sleep	☐	☐	☐	☐
(e) Other restlessness while you sleep; please describe	☐	☐	☐	☐