Examining the Sociocultural Context of Insomnia among Latinx Adults: A three-paper

dissertation

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Abstract

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The purpose of this three-paper dissertation is to examine the influence of different social processes on insomnia symptoms among Latinx adults. Qualitative and quantitative methods were used in an effort to adequately capture the complex ways in which these processes impact insomnia symptoms in this population. Given that insomnia is more prevalent among women than men and that previous studies suggest different gender patterns in the influence of social processes on mental health exist, each paper includes an exploratory aim that investigates potential gender differences in the associations it examines. Paper 1 uses thematic content analysis to explore how Latinx adults with chronic insomnia describe the social processes through which social ties impact their lived experience of insomnia. Paper 2 tests the independent and synergistic effects of family and friend social support and social strain on insomnia symptoms. Lastly, Paper 3 builds upon previous studies demonstrating a positive association between acculturation stress and insomnia symptoms among Latinx adults by examining two emotion-focused coping strategies (i.e., brooding and alcohol use) as potential mechanisms driving this association. Taken together, the findings from these three papers suggest there may be a need for mental health providers to evaluate and address social processes when diagnosing and treating insomnia among Latinx adults.

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Dedication

This is dedicated to my family.

Your strength and determination inspire me every day.

Preface

Approximately 30% of adults in the United States (US) experience symptoms of insomnia and 10% of the population has clinical insomnia.[1,2] In the general US population, women are approximately 1.6 times more likely to suffer from insomnia than men.[3,4] This psychiatric disorder is characterized by difficulty initiating and maintaining sleep,[2] and has been associated with significant health,[5–7] societal, and economic burden.[8,9] Although the prevalence of insomnia among Latinx adults in the US has increased significantly over the past decade (from 16.3% to 19.3%),[1] this population remains underrepresented in insomnia studies.[10] Identifying factors associated with increased insomnia symptoms among Latinx adults is a public health priority considering Latinxs are already disproportionately affected by adverse mental and physical conditions associated with this sleep disorder such as depression,[7,11] diabetes,[12] and cardiovascular disease.[13,14]

Guided by social determinants of health frameworks,[15,16] sleep health studies have recently expanded the examination of the predisposing, precipitating, and perpetuating factors of insomnia beyond traditional biological and behavioral factors to include social factors.[17–21] Specifically, a growing number of studies have investigated how social interactions between an individual and other people, communities, and cultures impact sleep health.[17,19,21,22] It is important to acknowledge that, as stated in social determinants of health frameworks, social interactions are shaped by the cultural and societal context within which they are embedded.[23,24] For example, because the Latinx convivial collectivistic culture places a stronger emphasis on warm, interdependent social ties when compared to the European-American individualistic culture, which prioritizes independence and self-sufficiency,[25] social ties may impact insomnia symptoms

differently among Latinx adults than European-American adults. Another example can be seen in the ways in which social identities, such as race, ethnicity, gender, and immigration status, influence social interactions.[23,24] For example, within the US context, Latinx communities are more likely to experience stressful social interactions due to their ethnic identity or immigration status when compared to non-Latinx White adults.[26] Therefore, examining the influence of social factors, particularly factors relating to social interactions, on sleep health in Latinx samples is important given that findings from studies conducted among majority non-Latinx White samples may not be generalizable to this population.

Social ties, which represent interactions between an individual and their family, friends, romantic partners, and others, are among the most widely studied social factors in the sleep health literature.[21,27,28] Social relationships and health studies suggest that social ties influence individuals' health through a variety of social processes, including social support, social stress, social control, personal control, and symbolic meaning.[29] The association of some social processes, such as social support and social stress, and insomnia symptoms have been established in the literature.[21,28,30] However, the influence of other social processes, such as social control, personal control, and symbolic meaning, remains elusive, particularly among Latinx adults. Dyadic examinations of sleep among romantic couples have demonstrated that couples influence each other's sleep behaviors by exerting social control through establishing daytime and nighttime routines that either promote or hinder good quality sleep.[27,31] There are very few studies exploring the association of personal control, defined as an individual's belief in the direct connection between their behaviors and their health,[29,32] and symbolic meaning, which refers to the social status derived from engaging in or avoiding specific behaviors,[29] and sleep health. These studies suggest that an individual's beliefs about their capacity to fall asleep and the importance of sleep

relative to other activities may limit sleep health.[33–36] It is important to note that although social relationships and health frameworks suggest these social processes interact with each other as well as with other psychosocial factors to influence health conditions, to date, studies have only examined them separately. Qualitative explorations of how individuals understand and experience the influence of these interacting social processes on insomnia symptoms may confirm or disconfirm existing quantitative findings and highlight new areas of scientific inquiry. Additionally, these narratives may help clarify how these social processes relate to the predisposing, precipitating, and perpetuating factors of insomnia and inform the integration of social factors into psychological treatments for insomnia.

   As previously mentioned, the associations between social support, social stress, and sleep health have been well documented.[21,30] Specifically, social support and social strain, a type of social stress, provided by family, friends, among other social ties have been associated with positive sleep outcomes, such as good sleep quality, and negative sleep outcomes, such as increased insomnia symptoms, respectively.[21,30,37] To a large extent, findings from Latinx behavioral health studies echo the health promoting effects of social support and the health damaging effects of social strain demonstrated in social ties and sleep health studies.[11,38,39] However, some studies reported that social support, mainly from friends, was positively associated with poorer health outcomes among Latina women.[40–42] Additionally, although social ties can be simultaneous sources of social support and social strain, very few studies have examined the synergistic effects of these characteristics on sleep health.[43–45] Among Latinx adults, the examination of these synergistic effects on insomnia may be particularly important given that the values of the Latinx convivial collectivist culture may enhance the benefits of social support or increase the detrimental effects of social strain on insomnia when the expectations of positive

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social interactions are not met.[25,46,47] Understanding the independent and synergistic effects of social support and social strain on insomnia symptoms among Latinx adults could help identify Latinx adults at increased risk of experiencing insomnia symptoms for referral to treatment.

In addition to the influence of social processes described above, studies conducted among Latinx adults have demonstrated the determinantal effects of culturally specific social stress (e.g., acculturation stress) on sleep health.[48,49] Acculturation stress is a type of sociocultural stress experienced in the context of intercultural interactions.[50,51] It refers to the psychological distress associated with the multi-dimensional challenges (e.g., family conflict due to cultural differences, experiences of discrimination, language barriers, etc.)[50,52,53] individuals from minority cultures often experience as they attempt to adapt to and adopt the majority culture.[50,51] Although studies have demonstrated a consistent association between increased acculturation stress and increased insomnia severity symptoms in population-based, nationally-representative samples of Latinx adults,[48,49,54] the mechanisms linking these factors remain underexplored. Insomnia models based on studies with majority non-Latinx White samples indicate that emotion-focused coping strategies, defined as attempts to regulate emotional reactions to acute stress without directly acting upon the source of stress, are important mechanisms linking stress and insomnia.[55,56] The most consistent evidence suggests rumination, a cognitive emotion-focused coping strategy,[57] and alcohol use, a behavioral emotion-focused coping strategy,[57] may drive the association between stress and insomnia.[58–63] However, these mechanistic pathways have not been tested to explain the relationship between specific types of sociocultural stress, such as acculturation stress, and insomnia. It is important to note that gendered patterns exist in the relationship between these emotion-focused coping strategies and insomnia. While rumination has been consistently more strongly associated with insomnia among women than men,[58,64,65] evidence demonstrating gender

differences in the association between alcohol use and insomnia is inconsistent.[63,66] While some studies suggest alcohol use and insomnia symptoms are more strongly associated among women than men, others have documented the opposite or no statistically significant gender differences in this association. [63,66] Examining the cognitive and behavioral coping strategies linking acculturation stress and insomnia symptoms among Latinx adults may help identify key targets of intervention in psychological treatments of insomnia in this population.

Sleep health experts have recently established that, in addition to biological and behavioral factors, sleep health is affected by social factors. However, the processes through which social factors, specifically social interactions, influence the precipitation and perpetuation of sleep disorders, such as insomnia, remain understudied, particularly among Latinx adults. Drawing from interdisciplinary theories including the Transdisciplinary Model of Stress,[67] conceptual models linking social ties, culture, and health,[25,29] acculturation theory, and biopsychosocial theories of insomnia, this dissertation uses qualitative and quantitative methods to examine the relationships between social processes and insomnia symptoms among Latinx women and men and investigate the potential mechanisms of these relationships. Additionally, given that insomnia is more prevalent among women than men and the effects of social factors and their potential mechanisms of influence have distinct gender patterns among Latinx adults, the gender differences in the associations between the social processes outlined above and insomnia symptoms are explored. The abstracts of each paper are described below followed by a description of the overarching conclusions and implications of this dissertation for social work practice.

Abstracts

Paper 1: Exploring the social context of insomnia: A thematic content analysis of the lived experiences of insomnia of Latinx adults

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Background: Although social ties have detrimental and beneficial effects on sleep health outcomes,[29,45,68,69] the social processes through which social ties affect sleep outcomes remain understudied, particularly among Latinx adults. These processes include social support, social stress, social control, personal control, and symbolic meaning.[29] Importantly, some studies suggest there are gender difference in how social ties influence Latinx health.[40–42] This study qualitatively examines how Latinx women and men with insomnia describe the social processes through which social ties shape their lived experience of this disorder.

Methods: Data from six focus groups conducted in 2017 as part of the Cognitive-Behavioral Therapy for Latinos study were analyzed using thematic content analysis. These focus groups were comprised of 35 Spanish- and English-speaking Latinx adults with insomnia. Focus group participants were 68.57% women, 68.57% Spanish-speaking, and had an average insomnia severity index score of 20.6 (SD=3.44) which indicates clinical insomnia of moderate severity.[70] Major and minor themes were identified in the transcripts. These themes were compared between Latinx women and men. The consolidated criteria for reporting qualitative (COREQ) research[71] was used to present the results.

Results: The most influential social ties were family ties followed by spousal/ romantic ties. The influence of social process on the lived experience of insomnia centered on three topics. The first topic identified social processes as predisposing, precipitating, and perpetuating factors of insomnia. Major themes in this topic included social stress (i.e., worrying /ruminating about others' problems, loneliness, and ethic discrimination) and social control (i.e., bedtime routines of others). The second topic related to how social support, through receiving advice from others, shaped participants' coping behaviors. Lastly, participants described their insomnia symptoms as negatively affecting their social relationships. Specifically, social stress through interpersonal

conflict was the major theme in this topic. The themes were similar between women and men. Notably, however, Latina women attributed their insomnia to the symbolic meaning of their gender identities, while men did not.

Conclusions: This paper is among the first to qualitatively examine the social processes through which social ties influence the lived experience of insomnia among Latinx adults. Future studies should investigate the potential reciprocal relationship between social processes, mainly social stress and social control, and insomnia symptoms. If these findings are corroborated, adapting psychological treatments for insomnia to address these social processes as key precipitating and perpetuating factors of insomnia may be important when treating this disorder among Latinx adults.

Paper 2: Independent and synergistic effects of social support and social strain on insomnia symptoms among Latinx women and men

Background: Although social ties are often simultaneous sources of social support and social strain,[29] very few studies have examined the synergistic effects of these social tie characteristics on insomnia. Latinx adults, principally Latina women,[72,73] may be particularly susceptible to the effects of family social strain on insomnia symptoms, especially when family ties also provide social support, because Latinx convivial collectivist cultural values create an expectation for family ties to be positive and warm.[25] In this paper, I examine the independent and synergistic effects of family and friend social support and social strain on insomnia symptoms and explore gender differences in these effects.

Methods: Data from a subsample of Latinx adults participating in the National Latino and Asian American Study(n=573) were used. The independent effects of family and friend social support and social strain on insomnia symptoms was tested using weighted Poisson regressions with robust

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error variance. To test the synergistic effects of these social tie characteristics, two four-level categorical variables indicating combinations of high/low social support and social strain— ambivalent, indifferent, low-quality, and high-quality— were created to represent family and friend tie categories. Weighted Poisson regression analyses were conducted to test the association of family and friend tie categories and insomnia symptoms adjusting for age, gender, immigrant status, and Latinx heritage. Gender-stratified analyses were conducted to explore differences between Latinx women and men.

Results: Participants were 62.00% women, 49.81% immigrant, 52.62% of Mexican heritage with a Mage=38 years (SE=14.28). The majority of family ties and friend ties were categorized as "ambivalent" (38.27%; 36.47%). Most participants reported experiencing insomnia symptoms (80.00%). There were no statistically significant independent or synergistic effects of family or friend social support and social strain on insomnia symptoms in the aggregate sample. Among Latina women, indifferent and low-quality friend ties, when compared to high-quality friend ties, were associated with a 35% and 37% increased prevalence of experiencing insomnia symptoms, respectively (PR=1.35, 95%CI:1.02-1.79; PR=1.37, 95%CI:1.01-1.85). Contrastingly, among Latino men, ambivalent friend ties were associated with a 26% decreased prevalence of experiencing insomnia symptoms when compared to high-quality friend ties (PR=0.74, 95%CI:0.59-0.93).

Conclusion: These findings suggest that simultaneously evaluating positive and negative aspects of friendships may help identify Latinx adults at greater risk of experiencing insomnia symptoms. If these findings are replicated, future studies should test whether adapting psychological treatments for insomnia to include modules aimed at managing the effects of social ties on mental

health, such as elements from interpersonal psychotherapy, increases the treatments' effectiveness among Latinx adults.

Paper 3: Examining the indirect effects of acculturation stress on insomnia symptoms through rumination and alcohol use on among Latinx women and men

Background: Acculturation stress, a type of sociocultural stress, has been consistently, positively associated with insomnia symptoms among Latinx adults;[48,49] however, the mechanisms of this association remain elusive. Models of insomnia suggest emotion-focused coping strategies, such as rumination and alcohol use, may drive the relationship between stress and this disorder.[55,61,74] Because acculturation stress has been positively associated with rumination and alcohol use,[75–78] these coping strategies may help explain the relationship between acculturation stress and insomnia among Latinx adults. Additionally, studies have found gender differences in the use of these coping strategies and sleep outcomes.[58,63,64,66] Thus, I examined the indirect effects of acculturation stress on insomnia through rumination and alcohol use and explore gender differences in these effects among Latinx adults.

Methods: Using survey data from the Latino Sleep and Health study (n=187), bias-corrected bootstrap tests of mediation with case resampling (1000 replications) were conducted to examine the indirect effects of acculturation stress and insomnia symptoms through brooding, a specific type of rumination characterized by negative preservative thoughts, and alcohol use. The primary models were unadjusted. Progressive adjustments were made for age, socioeconomic status, and psychological distress with the final model including all three covariates. Gender-stratified analyses were conducted to explore these mediation models separately in Latinx women and men.

Results: Participants were Mage=37.43 (SD=13.67), 64.17% were women, and 30.48% were of low socioeconomic status. Participants reported a mean acculturation stress score of

9.28(SD=9.51), brooding score of 9.44(SD=2.88), and insomnia score of 6.65(SD=5.51). In a typical week, participants consumed an average of 2.61 alcoholic beverages(SD=4.68). In primary models, the total and direct effects of acculturation stress on insomnia symptoms were significant, (b=0.04, 95% CI: 0.02-0.06; b=0.02, 95% CI: 0.004-0.04). The indirect effect of acculturation stress on insomnia through brooding were also significant (b=0.02, 95% BCa CI:0.01-0.03). Among women, this indirect effect via brooding had slightly larger coefficients than among men (b=0.02, 95% BCa CI:0.01-0.04; b=0.01, 95% BCa CI:0.004-0.04). Alcohol use was not a statistically significant mediator in this relationship (b=-0.001, 95% BCa CI:-0.004-0.0002).

Conclusion: These findings suggest that psychological interventions that focus on reducing brooding as a coping strategy for acculturation stress may promote healthy sleep among Latinx adults. Future studies should replicate these analyses using longitudinal study design to better determine the causal relationships among these variables.

Conclusions and Implications

This dissertation contributes to the sleep health literature by demonstrating the influential role of different social processes on insomnia symptoms among Latinx adults using qualitative and quantitative methods. Across all three papers, social interactions characterized by social stress were consistently associated with experiencing insomnia symptoms. In paper 1, themes relating to social stress, particularly the themes "worrying/ruminating about others' wellbeing" and "acculturation stress", were corroborated by the results from paper 3, which found that increased acculturation stress was statistically significantly associated with increased insomnia symptoms via brooding, a specific type of rumination. The findings from papers 1 and 2 suggest that a lack of social support may be an important risk factor for insomnia symptoms among Latinx adults. However, more studies are needed to replicate these results. Beyond the influence of social stress

on insomnia symptoms made evident across the three papers, findings from paper 1 highlight the impact of social control, personal control, and symbolic meaning on insomnia symptoms which warrant further investigation. Additionally, the exploratory findings suggesting some gender differences exist in the associations between social processes and insomnia symptoms across the three papers represent an opportunity for further scientific inquiry. For example, in paper 1, Latina women described their gender identity as contributing to their insomnia symptoms while Latino men did not. In paper 2, among Latina women, friend social ties characterized by a lack of social support were associated with increased prevalence of insomnia while among Latino men, friend social ties characterized by high social support and high social strain were associated with a decreased prevalence of insomnia. More studies are needed to examine the ways in which gender role expectations may shape women's and men's experiences of social processes and their influence on insomnia symptoms. Futures studies using longitudinal study designs and mixed methods should test the directionality of the relationship between social processes and insomnia symptoms and investigate how this relationship is experienced by Latinx women and men. Although further studies are needed, collectively, these papers suggest that there may be a need to address the detrimental and beneficial effects of social processes on insomnia in psychological treatments for this sleep disorder among Latinx adults.

Studies expanding on the findings of this dissertation should aim to address the cross-cutting limitations present in the three papers. First, as documented in previous studies the mental health and sleep health profiles of Latinx adults in the US vary significantly by Latinx heritage group.[79,80] Although this dissertation included Latinx heritage when describing the sociodemographic characteristics of the sample in each paper and included Latinx heritage as a covariate in paper 2, differences in the associations of social processes and insomnia symptoms by

Latinx heritage group were not explored. Future studies sufficiently powered to explore these differences may help identify subgroups of individuals who are at an increased risk of experiencing insomnia symptoms within the Latinx population. Secondly, beyond different Latinx heritages, the experience of Latinx adults in the US may vary widely based on their immigration history, documentation status, English-language fluency, level of acculturation, among other factors. Future studies should examine the influence of these structural and cultural factors on the relationship between social processes and insomnia, because they may shape the ways in which Latinx adults interact with other individuals, communities, and institutions, which, in turn, may impact insomnia symptoms. Lastly, across the three papers, the descriptions of potential gender differences in the associations between social processes and insomnia symptoms centered on Latina women and the endorsement of marianismo, the gender role expectations of Latina women within Latinx culture. Future studies should aim to include descriptions that represent the influence of gender role expectations for both Latina women and Latino men on social processes and insomnia symptoms, considering there is some evidence suggesting high endorsements of marianismo and machismo, the gender role expectations placed on Latino men within Latinx culture, are associated with worse mental health outcomes in the Latinx adult population.[72,73,81,82] This dissertation serves as a foundation upon which to continue building the scientific understanding of factors shaping the relationship between social processes and insomnia symptoms among Latinx adults.

In addition to these research and practice implications, this dissertation calls attention to areas of growth for the social work profession. First, although social work practitioners represent one of the largest groups of mental health providers in the US,[83] social workers do not receive extensive training on the diagnosis and treatment of psychiatric sleep disorders, such as insomnia.

Given the high prevalence of sleep disorders, especially insomnia, in the US, incorporating sleep health education into the social work curriculum would help social workers better meet the needs of the populations they serve. This curriculum should include training on the delivery of Cognitive Behavioral Therapy for Insomnia (CBT-I), the recommended first line treatment for this disorder.[84–88] CBT-I works by targeting thoughts, beliefs, and behaviors that impede good quality sleep and rebuilding the bed-rest association through sleep restriction.[88,89] Although the core components of CBT-I are expected to be as effective among Latinx adults than non-Latinx White adults (the population among whom this treatment has been widely tested),[87,88] based on the findings from this dissertation, social workers should incorporate considerations of their Latinx clients' social context when delivering CBT-I. Social workers may need to adjust the sleep guidelines or include additional recommendations that address barriers imposed by their clients' social ties to facilitate their client's adherence to treatment. For example, social workers should inquire about the sleep habits of other members of the client's household when discussing sleep restriction with their clients. If these sleep habits hinder the client's ability to adhere to their prescribed bedtime and waketime, the social worker should collaborate with their client to come up with solutions that would allow the client to follow the sleep restriction schedule as closely as possible, as recommended in standard CBTI procedures.[90] Among Latinx adults, these solutions may include inviting household members to participate in a CBTI treatment session[31] or engaging in Interpersonal Psychotherapy, a type of psychotherapy that aims to improve mental health by addressing problems within an individual's social relationships,[91] to help the client address potential conflicts with household members. Social workers already possess the foundation of knowledge to implement these adaptations in their clinical practice based on their training in the person-in-environment perspective.[92] Building on the socioecological theories taught in social

work foundation courses,[92] training programs modeling the application of these theories to deliver clinical assessment and treatment of insomnia in a culturally sensitive way when working with Latinx adults could be developed. These trainings would enhance social workers' ability to assess and address the social factors influencing their clients' mental and sleep health. The social work profession is well positioned to meet the needs of individuals suffering from insomnia and other sleep disorders, however, an investment in sleep health education and training is needed to help build social workers' skills in assessing for and treating these disorders.

Paper 1

Exploring the Social Context of Insomnia: A thematic content analysis of the lived experiences of insomnia of Latinx adults

Introduction

Insomnia, a psychiatric disorder characterized by difficulty initiating or maintaining sleep, or waking up too early accompanied by psychological distress,[2] is the most common sleep disorder in the United States (US) affecting approximately 1 in 3 adults.[93] The prevalence of insomnia among the general population has significantly increased in the past decade.[1] Latinx adults have experienced more accelerated increases in the prevalence of this disorder between 2002 and 2012 (16.6% to 19.3%) than any other racial/ethnic group in the US. Yet, insomnia remains largely understudied and underdiagnosed, particularly among Latinx adults.[1,94] The accelerated increase in the prevalence of this disorder among Latinx adults is alarming considering the adverse health outcomes associated with insomnia including an increased risk of developing depression,[7] anxiety,[7] diabetes,[12,95] and cardiovascular disease,[13,95] which are already affecting a large percentage of this population.[96–98] Recent studies have emphasized the influential effects of social ties on sleep health and the development of sleep disorders;[21,30] however, how individuals experience the effects of social ties on sleep and sleep disorders, such as insomnia, remains underexplored, most notably among Latinx adults. This study aims to explore how Latinx adults describe the social processes through which social ties shape their lived experience of insomnia.

Conceptual Framework

Decades of research has shown both beneficial and detrimental effects of social ties on overall health.[99–101] Although the exact mechanisms through which social ties impact health remain

elusive, Umberson et al.[99] suggests that different social processes affect health through shaping health behaviors as shown in their conceptual model for mechanisms linking social ties to health. [99] For example, social support, defined as a content feature of social ties associated with perceptions of informational, instrumental, or emotional assistance,[99] may influence health through buffering the effects of stress,[102] supporting self-regulation,[103,104] and setting off biological processes that promote overall health.[99–101,105,106] Contrarily, social stress, a content feature of social ties associated with challenges encountered in the social context that surpass one's coping resources,[99,107] may increase the risk of engaging in health damaging behaviors and trigger physiological reactions that can damage health over time.[99,108,109] Social support and social stress are the most commonly studied social processes through which social ties affect health, however, the complex interaction among the social processes beyond social support and social stress must be examined to assess sources of risk and protection for health disorders within an individual's social context.[99]

In addition to independently impacting health, social support and social stress interact with other processes of social ties, such as social and personal control, to influence health.[99,110] Social control refers to the environment, norms, values, and beliefs created by one's social ties which facilitate or prohibit individual health behaviors.[99] An example of social control can be seen in the effects of marriage on creating a social context in which health habits are developed and encouraged.[99] Studies have demonstrated that when a marital relationship is perceived as a source of social support, attempts at exercising social control through varying tactics, such as adjusting the home environment to accommodate healthy behaviors, generally result in positive health behavior changes.[110] Personal control is defined as one's belief that one is able to engage in goal directed actions to directly impact one's health outcomes.[32,99] This social process is generally

informed by social ties through the internalization of habits and values created through social control.[99] Under conditions of stress, social support can bolster personal control facilitating healthy behaviors and supporting overall health.[111,112] Contrarily, social stress can undermine feelings of personal control which may lead to engaging in detrimental health behaviors through limiting an individual's ability to self-regulate.[113] The influence of social support and social stress on social and personal control provide an example of the complexity of the interactive relationships among the social processes through which social ties affect health.

Symbolic meaning, another social process created through one's social ties, may also facilitate or inhibit positive health behaviors.[99] This process is more difficult to measure than other social processes because it refers to the perceived social status ascribed to specific behaviors within a social context. For example, as work hours have extended due to globalization and the use of technology, an individual's work productivity has become a marker of success and social status, particularly in the US, leading many to view sleep as a less socially desirable behavior.[114–117] However, in recent years, companies in certain industries, such as technology companies, have recognized the importance of healthy sleep for work performance and have started to encourage their employees to sleep more by implementing nap rooms in their offices.[118] This messaging signals a possible cultural shift towards viewing sleep as a valuable component of being successful. Although this social process is among the least studied, symbolic meaning may be a powerful driver for certain health promoting or health damaging behaviors.

Social Ties and Sleep Health

Although not referenced in Umberson et al.'s conceptual model,[99] there is a growing body of literature indicating that the social processes outlined in this model impact sleep health.[21,27,30,31] For example, the positive effects of the content features of dyadic relationships, such as

relationship quality, on women's sleep health have been well documented.[119] Troxel et al.[27,120,121] demonstrated that good quality marital relationships, measured through marital satisfaction and happiness, were significantly associated with better sleep quality and longer sleep duration in large samples of multi-ethnic women.[119,121] Studies have also examined the associations of social support and social stress on sleep outcomes in other social ties domains, such as family ties and friend ties. A meta-analysis of 61 studies conducted among majority non-Latinx White samples demonstrated that social support from various types of relationships including family, friend, and romantic relationships was significantly associated with improved sleep outcomes including increased sleep quality and duration, and decreased sleep disturbances and insomnia symptoms.[30] Social stress, although less commonly studied in sleep health research, has been consistently associated with poor sleep outcomes including poor sleep quality[37,122] and an increased risk of experiencing insomnia symptoms.[43] These findings suggest that social support and social stress from different social tie domains can either promote sleep health or be risk factors for experiencing poor sleep quality, including insomnia symptoms.

Other social processes outlined in Umberson et al.'s model[99] have not been as thoroughly examined as social support and social stress in sleep health research among adults. Although the association of social control and sleep was not examined, the influence of social control in the development and maintenance of insomnia symptoms was described in Rogojanski et al.'s[31] insomnia treatment model incorporating dyadic relationships. Rogojanski et al.[31] explained that romantic partners exert social control on each other through creating and enforcing daytime and bedtime routines which may either increase or decrease the risk of experiencing insomnia symptoms. According to the principles of stimulus control therapy, a behavioral treatment for insomnia, insomnia symptoms arise, in part, because the association between the bed and sleeping

has been eroded due to regularly engaging in poor sleep hygiene behaviors.[123–125] One of these poor sleep hygiene behaviors is getting into bed even when one does not feel sleepy.[123–125] In the context of romantic partnerships, couples may decide to go to bed together every night. If one person does not feel sleepy at this time and goes to bed anyway on a regular basis, the bed will no longer serve as an external cue of falling asleep. Instead, the bed will become another place where wakeful activities occur. In this way, social control, exerted through establishing a bedtime incompatible with a person's sleep habits may perpetuate and possibly exacerbate insomnia symptoms in that person. However, if the couple's bedtime coincides with the time both partners are sleepy, the social control exerted in the relationship could help establish regular bedtimes, a healthy sleep hygiene behavior that may reduce the risk of experiencing insomnia symptoms.[123,124] To date, very few studies examining the effects of social control on insomnia symptoms exist.

The association of personal control and insomnia also remains understudied in the sleep health field. Studies examining the association between personal control and insomnia symptoms have highlighted the ways in which this social process may be detrimental or beneficial to sleep quality. On one hand, individuals experiencing insomnia symptoms may exercise personal control by engaging in behaviors that they believe will induce sleep. For example, people with insomnia may decide to lay in bed before they feel sleepy to try to make themselves fall asleep.[55,126] However, as mentioned earlier, spending time in bed when one does not feel sleepy may exacerbate insomnia symptoms. [123–125] In fact, according to the attention-intention-effort pathway theory of insomnia and the cognitive model of insomnia, effortful attempts to induce sleep are often counterproductive, promoting psychological and physiologic arousal instead of rest.[55,126] This theory was demonstrated in one study conducted among people with chronic insomnia which found that increased perceived personal control, measured through one's belief in one's ability to

fall and stay asleep, was associated with increased sleep-anxiety, a common symptom that co-occurs with insomnia.[36] On the other hand, studies have indicated that increased personal control, operationalized as self-confidence and confidence in one's ability to engage in behaviors that induce sleep, is associated with lower insomnia symptoms,[35,127] particularly in the context of CBT-I.[128,129] It is important to note that in these studies, personal control was related to an individual's confidence in their ability to engage in behaviors that promote sleep, not in an individual's confidence in their ability to fall asleep. Based on the same cognitive theories of insomnia previously described, directing a strong sense of personal control towards adhering to healthy sleep habits, such as focusing on relaxing before bed, instead of the act of falling asleep, may help manage insomnia symptoms more effectively.[128,129] These studies suggest social processes may impact insomnia symptoms by influencing internal factors, such as one's belief in one's ability to sleep or engage in healthy sleep habits , however, because few studies examining these associations exists, further investigation is warranted.

Additionally, although the association between symbolic meaning and sleep behaviors was initially theorized by a sociologist in the early 1990's,[130] to date, very few sleep studies have examined this relationship. One qualitative study explored men's attitudes towards sleep and found that most men described sleep as essential to performing their social roles, but they also prioritized performing those social roles over sleep duration or quality.[131] Separately, a quantitative study conducted among women and men examining the relationship between masculinity and sleep found that men who were described to sleep "a little" versus men who were described to sleep "a lot" in vignettes were rated as more masculine.[34] In the same study conducted among a different sample of participants, those who were asked to design male characters who were stereotypically very masculine described their characters as sleeping significantly fewer minutes than those who

were asked to design characters who were stereotypically not masculine.[34] These findings suggest that healthy sleep may not be a desirable behavior among men who ascribe to masculine ideals.[34] To date, women's views on sleep and its impact on their social roles or status have not been examined. Even though some studies have demonstrated the association of these social processes and sleep outcomes, the influence of social control, personal control, and symbolic meaning on sleep health outcomes, such as insomnia symptoms, remains mostly theoretical.

Present Study

Although there is enough evidence to suggest there is a relationship among social support, social stress, social control, personal control, symbolic meaning and insomnia symptoms, further research is needed to explore how these social processes are understood and experienced by those suffering from insomnia.[21,30,99] To date, most sleep health studies have utilized quantitative methods to test the relationship between different social processes and insomnia symptoms; however, qualitative methods may provide a richer exploration of these interacting social processes through participants' descriptions. Open-ended inquiries provide participants with the opportunity to elaborate on their responses revealing details and nuances that quantitative methods may not capture when exploring similar topics.[132] Qualitative methods are underutilized in insomnia research as demonstrated by a recent systematic review which reported that only 22 qualitative studies published from inception to 2017 examined the lived experience of insomnia among adults.[133] Notably, these qualitative studies were conducted in majority non-Latinx White samples or did not report the race/ethnicity of the participants.[133] Conducting qualitative studies on people's lived experiences of insomnia and the social processes that affect that lived experience could generate a deeper understanding of the complex risk and protective social factors of this psychiatric disorder.

In addition to the limited exploration of the ways in which social processes impact the lived experience of insomnia, the associations between social processes and sleep health have been examined in majority non-Latinx White samples, with the exception of one study that reported results stratified by ethnicity.[121] This limits the generalizability of the findings to populations with similar conceptualizations of the role of social processes in shaping one's values, beliefs, and behaviors. For example, among Latinx adults, the relationship between social support and sleep health may have dualistic, meaning positive and negative effects on sleep health outcomes, whereas among non-Latinx White adults social support has been consistently associated with positive sleep health outcomes.[30] The Latinx cultural orientation of convivial collectivism which emphasizes interdependence among individuals to promote the wellbeing of the group, particularly within families,[46] contrasts the European-American cultural orientation of individualism which emphasizes independence and prioritizes one's individual wellbeing.[25,46,134] Convivial collectivism may lead Latinx adults to experience social stress through increasing feelings of social obligation towards others.[25,134] In a qualitative study by Viruell-Fuentes[135] exploring the influence of social ties on Latinx health among first- and second-generation Mexican women, first-generation immigrant women described having benefited from family social support in their transition from Mexico to the US but felt burdened by the obligation to reciprocate the support while having limited resources.[135] Importantly, quantitative studies on social ties and Latinx health have found gender differences in the association between social support and varying health outcomes.[40,42] While social support was consistently associated with positive health outcomes among men, among women increased social support was associated with increased odds of experiencing depressive symptoms,[136] smoking,[40] and increased levels of inflammatory biomarkers.[42] To date, these gender differences have been underexplored in qualitative studies.

Viruell-Fuentes's[135] qualitative study also highlighted another potential difference between the influence of social processes among Latinxs and non-Latinx Whites. Second-generation Mexican women described their family, friend, and neighborhood social ties as allowing them to explore Mexican culture and develop their identities, but also exposing them to racial/ethnic discrimination and to feelings of marginalization.[135] The experience of racial/ethnic discrimination, a type of social stress that non-Latinx Whites may not be exposed to, may negatively impact Latinxs' lived experience of insomnia. Lastly, social control and personal control may also be experienced differently in this ethnic group because Latinx cultural values center family as referents of attitudes and behaviors[137] throughout the life course whereas among non-Latinx White adults, familial influence is largely limited to childhood and adolescence.[138] As demonstrated by the previously described qualitative studies, qualitative research methods allow participants to provide rich accounts of their lived experience which, in turn, provide researchers with a breadth and depth of information necessary to examine complex phenomena. Using this research method may be particularly beneficial when examining the influence of the multiple and interacting social processes on the lived experience of insomnia among Latinx adults.[45,99,139]

The aim of this paper is to use thematic content analysis[41] to explore how Latinx adults describe the social processes through which social ties affect their lived experience of insomnia. Because widely referenced models of insomnia describe the pathogenesis of this disorder as a combination of predisposing, precipitating, and perpetuating factors,[140,141] the thematic content analysis highlights descriptions of how social processes contribute to these factors. Predisposing factors refer to an individual's characteristics or traits that increase their risk of experiencing insomnia.[140] Precipitating factors are often described as stressful events or circumstances that trigger the onset of insomnia symptoms.[140] Perpetuating factors are habitual behaviors that

maintain the experience of insomnia symptoms even after precipitating factors subside.[140] Given that insomnia studies and Latinx health studies have examined the effects of social processes from varying social tie domains (e.g., family, friends, romantic partners, etc.), this analysis identifies the source of the social processes to explore which social tie domains are described as influential on the lived experience of insomnia among Latinx adults. Additionally, this study explores differences and similarities in how Latinx women and men describe the social processes that shape their lived experience of insomnia. Findings from this study may help identify novel and culturally salient targets of intervention in psychological treatments of insomnia that address the predisposing, precipitating, and perpetuating factors of insomnia among Latinx adults beyond the biological, behavioral, and cognitive factors traditionally addressed in these treatments.[88]

Methods

This analysis utilizes focus group data collected in 2017 as part of the Cognitive Behavioral Therapy for Insomnia (CBTI) for Latinos (CLIO) study. This study aimed to explore culturally specific factors contributing to the initiation and maintenance of insomnia to inform the cultural adaptation of a psychological treatment for insomnia for Latinx adults and to examine the acceptability and feasibility of a digital treatment for insomnia. The consolidated criteria for reporting qualitative research (COREQ)[71] guided the description of the study methods and the reporting of the results in this analysis. COREQ is a 32-item checklist divided into three domains created to encourage transparency and complete reporting of qualitative research methods.[71] It was developed by Tong et al.[71] to increase the reliability and validity of qualitative research after systematic reviews of qualitative research demonstrated clear inconsistencies in the description and reporting of study methods and results.[71] The domains include: 1) the research team and reflexivity domain, 2) the study design domain, and 3) the analysis and findings domain.[71] Each

domain is further divided into subcomponents. The items relevant to this study are described below.

Domain 1: Research team and Reflexivity

Focus groups were led by two to three bilingual facilitators using a semi-structured interview guide in either English or Spanish. These facilitators included the Principal Investigator, who is female, an immigrant from the Dominican Republic, and has a PhD in Clinical Psychology, the Project Coordinator, who is female, an immigrant from Spain, and has a PhD is Social Ecology, and a PhD student who is female, an immigrant from Mexico with Argentine heritage, and has a Master's degree in Social Work. All three facilitators had experience conducting sleep research and were actively engaged in primary data collection of sleep data in the Latinx community. The facilitators may have had previous contact with focus group participants if participants had enrolled in another study conducted by the focus group facilitators. This relationship is not expected to have influenced participation in the focus group discussions although some participants may have felt more comfortable expressing their opinions because of their familiarity with the facilitators. After discussing potential biases with the Principal Investigator, the first author determined that the facilitators' immigrant identity may have made the facilitators more likely to dedicate more time to descriptions of participants' migration stories as they described the precipitating and perpetuating factors of their insomnia symptoms instead of redirecting the focus group conversation to other topics. Additionally, the fact that the facilitators were female may have made women more comfortable participating while potentially limiting men's willingness to share their experiences in the focus groups. However, these biases are not expected to have significantly altered the focus group discussions.

Domain 2: Study Design

Theoretical Framework. Focus group transcripts were coded and interpreted using thematic content analysis.[142,143] Thematic content analysis is used to find, analyze, and describe patterns in the form of themes across sources of qualitative data.[142] These themes are then interpreted by researchers in relation to the research question, its socio-political context, and previous literature on the topic.[1][142] In this study, the themes produced through thematic content analysis allowed for an exploration and description of the role of the social processes in the experience of insomnia among Latinx adults.

Participant selection. Participants were recruited using convenience sampling methods at community centers, health fairs, and a primary health care clinic in New York. CLIO study personnel distributed flyers at these locations and approached potential participants to describe the study and gauge interest. Participants were also drawn from a repository of Latinx research volunteers who consented to being contacted in the future for research purposes. Before attending the focus groups, participants completed a screening survey online or over the phone to assess for their eligibility. Participants were included in the study if they were eighteen years of age or older, identified as Latino or Hispanic, spoke English, Spanish, or were bilingual, and reported experiencing clinically significant insomnia symptoms for three or more months.

To evaluate for clinical insomnia, participants completed the Insomnia Severity Index[144] (ISI) as part of the screening survey in either English or Spanish. The ISI is a validated 7-item scale that asked participants to rate the level of difficulty and distress their insomnia symptoms have caused them over the past two weeks.[144] Participant responses are summed and categorized into four groups. Scores 0-7 indicate no clinically significant insomnia, 8-14 indicate subthreshold insomnia, 15-21 moderate insomnia, and 22-28 severe insomnia.[144] The ISI has been validated in Spanish-speaking samples[145] and has strong psychometric properties[144,146] with a Cronbach's alpha

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of 0.71 for this sample. Only participants who were classified to have moderate or severe insomnia (ISI ≥ 15) were eligible to participate in the focus groups. If participants were deemed unable to complete the study protocol due to cognitive impairment, severe medical or mental illness, or active substance use or participants were unable to attend the focus group sessions for any reason, they were excluded from the study. All participants provided informed consent before completing the screener survey and before participating in the focus groups. This study was approved by the Columbia University Institutional Review Board (IRB AAAR1336).

Out of 95 people who completed the screening survey, 51 met the inclusion criteria. In total, sixteen people were excluded from the study because they were either no longer interested in participating or were unable to attend the focus group sessions scheduled. A total of six in-person focus groups were attended by nine English-speaking and 26 Spanish-speaking Latinx adults with chronic insomnia. Most of the participants were female (62.86%), on average participants were 65.43 years old (SD=12.63) and had an average ISI score of 20.6 (SD=3.44), which indicated moderate insomnia severity. Other participant characteristics are presented in Table 1.1.

[Insert Table 1.1]

Setting. The CLIO study took place in New York, NY where the Latinx population makes up approximately 29% of the total population.[147] The largest Latinx heritages represented in the Latinx New York City population include those from Puerto Rico, the Dominican Republic, Central and South America, and Mexico.[147] Although the recruitment efforts were not geographically bound, 37.14% of participants were recruited into the study by research staff in a primary care clinic in Washington Heights, where a large concentration of Latinxs from the

Dominican Republic reside (26-53% of the total Dominican population living in New York City).[147]

The focus groups were conducted at the Columbia Community Partnership for Health (CCPH) located in Washington Heights, an ethnic enclave in New York, NY. The CCPH is part of the Columbia Irving Institute for Clinical and Translational Research's Community Engagement Core Resource. This community health center was created to foster connections between Columbia University researchers, local community organizations, and the residents of Washington Heights. It is easily accessible by public transportation.[148] All of the community health center's staff are bilingual and have extensive experience serving the Latinx community. Some participants were familiar with the community health center and staff.

Data collection. Participants were placed into English or Spanish focus groups depending on their language preference. Each focus group consisted of between four to nine participants. Two focus groups were conducted in English and four were conducted in Spanish. All focus group discussions began with an explanation of the focus group goals and an exploration of the participants insomnia history. The semi-structured interview guide (Appendix A) continued with more specific questions about CBTI and its acceptability to participants. Each focus group was audio recorded using an encrypted device after all participants consented to participate and gave permission to be audio recorded. Although facilitators present were taking notes throughout each focus group, one facilitator was assigned to take detailed notes each meeting. These notes were then discussed with the study team during weekly meetings.

Focus group discussions had an average duration of 73.67 minutes with the longest focus group lasting 87 minutes and the shortest 60 minutes. After each focus group the audio recording was uploaded to the study desktop computer and sent for professional transcription. The transcripts

were returned in about five to seven days as Word documents for review by study personnel. A bilingual member of the CLIO team checked the transcription for accuracy and deleted any personally identifiable information included (i.e., participants' last names). The de-identified, and clean transcripts were used for data analysis in this study. Although this study is based on secondary data analysis, theoretical saturation, defined as the point at which no new data is being collected on a particular topic,[149,150] is believed to have been attained with 35 participants.

Domain 3: Analysis and Reporting

Data Analysis. Sociodemographic characteristics, insomnia symptoms, and length of time experiencing insomnia collected through the screening survey are summarized in Table 1.1. First, an initial review of the transcripts was conducted by the first author to further refine the preliminary codebook with input from the Principal Investigator. The first author identifies as a first-generation Latina immigrant and is bicultural and bilingual. She was one of the facilitators in the focus groups. Then, two bilingual coders coded the transcripts in their initial language of administration using the qualitative software program NVivo version 12.[151] One coder was the first author and the other was an undergraduate research assistant who identifies as a second-generation Latino. To calibrate, the coders reviewed two transcripts independently (one English and one Spanish) and met to discuss coding decisions including new codes identified throughout the review. The coded segments of the remaining four transcripts were compared to examine the interrater agreement. An average of 94.75% agreement was achieved which indicates excellent interrater agreement.[152]

Although the entirety of the transcripts was reviewed, the responses to the questions "Q2.) What factors would you say contributed most to the start of your insomnia? What factors would you say contribute to the continuation of your insomnia? Q3.) Have specific factors related to your ethnicity, race, identity, socioeconomic status, language fluency, or neighborhood contributed to

your insomnia? Why or why not?" (Appendix A), were targeted during the coding process. Other questions that were reviewed are also highlighted in Appendix A.

Excerpts were identified and grouped according to similarities and conceptual relationships using thematic content analysis.[143] Codes and themes were guided by the research questions as well as developed inductively to allow for unexpected insights to emerge from the transcripts. Predetermined parent codes, defined as overarching categories of patterns found in the transcripts,[153] included predisposing, precipitating, and perpetuating factors of insomnia as well as influential social tie domains. Two other parent codes, coping with insomnia and insomnia's effects on social relationships, emerged while reviewing and coding the transcripts. Predisposing, precipitating, and perpetuating factors as well as coping with insomnia included child codes, defined as specific patterns within an overarching category, or parent code,[153] to identify descriptions of how social processes (i.e., social support, social stress, social control, personal control, and symbolic meaning) impacted insomnia symptoms. The parent code "influential social tie domains" also had child codes to specifying the social tie domain being referenced in the segment (i.e., family, friends, spouse/ romantic partners, and others). Other social tie domains were added as they appeared in the transcripts (i.e., work relationships, neighbors, and pets). This codebook (Appendix B) was used by both coders. Coded excerpts were categorized by the gender of the respondent to explore potential differences in how Latinx women and men describe the social processes shaping their lived experience of insomnia.

Reporting. Participant names were not included to preserve anonymity when reporting excerpts in the results. Instead, the participant's gender and focus group language of administration were indicated before representative quotations. Excerpts originally transcribed in Spanish were translated to English. These translations are presented in italics. Themes and patterns are described

in detail throughout the results section differentiating between pre-specified themes and data-driven themes. A clear distinction between major and minor themes was also included. Major themes reflect patterns in participant narratives that were discussed by multiple participants within each focus group and permeated across the majority of focus groups transcripts. Minor themes indicate topics that were mentioned by a few participants across multiple focus groups or represent a unique perspective generated in one or two focus groups.

Results

The influence of social processes on the lived experience of insomnia were categorized into three main topics: 1) social processes as predisposing, precipitating, and perpetuating factors of insomnia, 2) social processes' impact on coping with insomnia, and 3) insomnia symptoms' effects on social relationships. Within each topic, major and minor themes were identified (Figure 1.1). Examples of quotations for each major and minor theme are represented in Table 1.2. Across all themes, family social ties appeared to have the strongest influence on insomnia symptoms because they were mentioned more frequently in coded segments compared to other social tie domains. Spouses/romantic partners were also mentioned frequently throughout the transcripts. A summary of the frequency in which each social tie domain was coded in segments also coded for social processes can be found in the supplemental table (Appendix C). As part of the exploratory aim, a description of topics and themes by gender is presented.

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[Insert Table 1.1]

Social processes as predisposing, precipitating, and perpetuating factors of insomnia

Although precipitating and perpetuating factors were asked about separately during the focus group interviews, the majority of participants did not demarcate their experiences in this

manner. Therefore, descriptions of precipitating and perpetuating factors are described in tandem. Because predisposing factors were spontaneously discussed in the focus groups, they were included in these results. Overall, social stress was identified as the main social process contributing to the precipitation and perpetuation of insomnia symptoms. The major themes described below are types of social stress and social control that influenced participants' insomnia symptoms. Personal control and symbolic meaning were minor themes. Social support was not discussed when describing these factors.

Major themes

Social stress: Worry and rumination about others' problems. One of the most prominent themes was the influence of social stress experienced within family ties on insomnia symptoms. Several participants attributed the precipitation of their insomnia symptoms to illnesses or deaths of loved ones, particularly children and close relatives. These impactful events were also referenced when participants described the perpetuating factors of their insomnia. They described not being able to fall asleep because they ruminated on these events. An English-speaking woman described her experience having difficulty maintaining sleep:

> I've lost two brothers in the past five years, so it's just waking up and they all were tragic, they all… passed away tragically, so it's like I can't believe this happened, you just start going through memories and the whole situation, so- and I- I don't stay in bed… sometimes I just go through life experiences and, you know, memories and it just, you know, keeps going and going and before I know it hours have passed.

Participants also described how their sleep was affected by their constant worry about others' wellbeing, particularly family members in and outside the United States. One Spanish-speaking woman summarized the discussion stating, "Each child that you have [that has a problem] or family member that has a problem, it's also your [problem]. And unfortunately, we dwell too much on those problems." Participants seldom described their worry about not being

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able to fall asleep, which is a common perpetuating factor of insomnia,[55,154] as contributing to their insomnia symptoms.

Social Stress: Loneliness. Another social stressor described as a precipitating and perpetuating factor was loneliness. Several participants, particularly men, attributed their insomnia to being separated from their spouses and families. These separations were due to divorce/ break up and migration to the United States. One Spanish-speaking man stated:

> And also, the fact of family separation. The lack of affection, the lack of… living alone in a place, in a room or an apartment, no matter how luxurious it is, one is alone, and one gets home from work and goes. And at night it is when it [the separation] is most evident, the problem has more weight.

Social Stress: Ethnic discrimination. Participants described anti-immigrant sentiment in the media and ethnic discrimination as a source of ongoing social stress impeding good quality sleep. Some participants made specific references to the anti-immigrant rhetoric used by the 2016-2020 Presidential Administration[155] as a source of stress for the wellbeing of their families, their communities, and themselves. Others described difficulty securing high-paying employment and financial stability despite being well educated because they are immigrants. One Spanish-speaking man stated:

> The thing is that we don't earn like the Whites earn, you know? An example, I have a degree in business administration. I cannot practice my profession here, because I would have to go to college again to study. And imagine, me at 63 years old going to college, with a family to support.

Social Control: Others dictating bedtime routines. Social control was described as a predisposing, precipitating, and perpetuating factor of insomnia by establishing undesirable sleep patterns among participants. These sleep patterns tended to be determined by parents during childhood (predisposing factor) or by spouses/romantic partners' sleep habits (precipitating and

perpetuating factors). One English-speaking woman described how her insomnia may have developed when her partner's sleep schedule started to conflict with her schedule stating:

> And another part was I had a significant other who worked the night shift, so it kind of worked out that I would fall asleep during the day with him, and I would be up at night and it kind of worked out that way. But then, afterwards, I need to have a regular schedule, you know? I'd go to my appointments or- and now I have to because I have my home attendant be up at a certain time, so there's a few things that's contributing to the insomnia.

Minor themes. A minor theme related to social stress due to acculturation stress was discussed at great length in two focus groups. Several participants described feeling like outsiders in their families and communities due to differing views on cultural values, such as respeto [respect], which encourages a formal politeness and regard for authority, specially of elders, and familismo [familism], which emphasizes the importance of warm, interdependent relationships within the family.[25] They stated that their concerns over what they viewed as a deterioration of values within their families contributed to the worries that kept them up at night. Two other social processes --personal control and symbolic meaning--, were also described as predisposing, precipitating, or perpetuating factors of insomnia. Participants described their behaviors, such as using social media in bed, as directly contributing to their insomnia symptoms. The social process of symbolic meaning was invoked when women in a few focus groups described their experience of insomnia symptoms as part of womanhood and motherhood. They described caring for and worrying about their families as central to their social identities as women and mothers which often meant they spent fewer hours sleeping compared to other family members and experienced poor-quality sleep because they were preoccupied with concerns about their families.

Social processes' impact on coping with insomnia

Although not originally included in the codebook, upon reviewing the transcripts, themes relating to how participants coped with their insomnia symptoms emerged. Social support was the

major social process mentioned in this section. Effective and ineffective efforts to cope with insomnia through personal control were also mentioned.

Major themes.

Receiving helpful and unhelpful social support. Participants described attempts by spouses/romantic partners, family members, co-workers, and friends to support them through their insomnia. They characterized some social support as helpful such as receiving advice on natural products to use to induce sleep, even when the products did not work, or they were unwilling to try them. One Spanish-speaking woman stated, "A lot of people tell me to try natural products, whatever, I don't want to. I don't want to because I am afraid of becoming addicted to medication. I prefer to make tea, chamomile, linden, something natural and not to take medication. I don't want to."

Other attempts at providing social support were perceived as overly controlling. For example, participants described their spouses' encouragements to go to sleep at a certain time as analogous to being told to go to bed by a parent. One Spanish-speaking women described a conversation in which her husband expresses concern for her lack of sleep and encourages her to go to bed even when she is not sleepy:

> Because he argues with me "But woman, how are you—still?" He sees that is 2:00am, that it's 3:00am. Because he sees the clock and that I'm not in bed yet. So [he says] "You are going to get sick if you stay awake so long, you don't sleep." [I answer] "But my love, if I'm not sleepy, what do you want me to do?"

Although not directly associated with insomnia symptoms, a few participants described friends and family members supporting their overall mental health as a way to improve their sleep. One Spanish-speaking woman stated, "That is what my daughter-in-law and son say to me "Learn to say no"... Because I always try to please and please others."

Minor themes.

Pets serving as emotional support. One participant mentioned they benefited from the support and company of their dog. They stated that having the dog with them helped them feel calm and less lonely at night which helped them fall asleep.

Poor and healthy sleep hygiene. Several participants described the types of behaviors they engaged in to cope with their insomnia symptoms. It is worth noting that several participants described engaging in poor sleep hygiene practices such as watching TV in bed and eating heavy meals in the middle of the night to cope with their insomnia symptoms. Others described healthy sleep hygiene behaviors such as getting out of bed if they could not sleep and reading somewhere other than their bed until they got tired. Towards the end of the focus group, some participants shared their plans to create healthy sleep routines to improve their symptoms, such as establishing regular bedtimes and turning off the TV before going to sleep. These descriptions are indicative of personal control because participants attribute their insomnia symptoms to their personal actions. Effects of insomnia on social relationships

Although the transcripts were originally reviewed to examine the influence of social processes on insomnia symptoms, patterns highlighting the influence of insomnia on social relationships became evident across all six focus groups. Two major themes emerged: 1) insomnia symptoms led to increased conflict in relationships, 2) insomnia contributed to feelings of guilt and discomfort in relationships. It is important to note that several of the participants' descriptions were prompted by a question about motivations for seeking insomnia treatment. Additionally, in these narratives, the overlapping influence of several social processes, mainly social support, social control, and social stress, became evident.

Major themes.

Interpersonal Conflicts. Participants described that their insomnia contributed to conflicts in their romantic relationships and created tense situations with their co-workers and family members. Several women described getting into arguments with their spouses in bed because of their sleep patterns and behaviors. One Spanish-speaking woman, who in addition to suffering from insomnia symptoms was experiencing menopausal symptoms, recounted an argument with her husband in the middle of the night:

> One of these nights I got one of those hot flashes. Look, I took my sheet off, I took the comforter off, I took of my socks. I didn't wake up in the nude, I didn't take off my clothes by coincidence. And my husband says, "Don't move so much." [I answered], "No, no, no, if you don't want me to move I'll leave the bedroom." Because I don't know—we get in a bad mood because of this situation [insomnia].

Her story is an example of the ways in which social processes overlap. In this narrative the spouse contributed to the conflict by establishing social control of appropriate behavior in the bed (i.e., staying still) which was discordant with the participant's needs to feel comfortable in bed. Later in the narrative, the participant described how her spouse became more supportive once she explained her condition and did not expect her to stay in bed all night as she coped with her insomnia and menopause symptoms. This interaction between social processes was evident in other narratives.

Not wanting to disturb others. When describing motivations for seeking treatment for insomnia, participants cited wanting to improve their personal relationships because they felt insomnia was damaging their relationships. In addition to the conflicts described above, participants expressed feeling guilty because they felt their insomnia was affecting their bed partner's sleep. For example, one Spanish-speaking man stated:

> When [my partner] sees that I am awake, they say "Turn the TV on, distract yourself," they say. Uh, that's what I do, but I feel uncomfortable that I am robbing them of their sleep. And this isn't something that is one month, or one week, this has been going on awhile.

The next day, I see that the other person leaves, they wake up, do their normal routine, and I see they are tired. Meaning, because they support me, they are being affected.

Gender differences in themes

There were many similarities in the ways in which women and men described how social processes impacted their lived experience of insomnia. Women and men described influential social tie domains such as family and work ties with similar frequencies. Both genders also described stress associated with work and relationships with bosses and co-workers as contributing to their insomnia symptoms. However, women brought up how their spousal/romantic relationships and insomnia symptoms impacted each other more often than men. They also tended to describe social stress from caregiving for family members more often than men. Additionally, women attributed their insomnia symptoms, in part, to their social identities. They described that their identities as women and mothers meant they had to prioritize serving others above their need to obtain a good night's sleep.

Discussion

The aim of this paper was to explore how Latinx adults described the social processes through which social ties impacted their lived experience of insomnia. Participants' narratives demonstrated that social processes impacted their lived experience of insomnia in a variety of ways. These descriptions were categorized into three main topics. The first topic coincided with the pre-specified codes identifying social processes as predisposing, precipitating, and perpetuating factors of insomnia. The second topic emerged from the transcripts as participants described how social processes shaped how they coped with their insomnia symptoms. The third topic, which also emerged from the transcripts, encapsulates participants' descriptions of how their insomnia symptoms impact their social relationships. Although all five social processes were represented across the topics, the major themes centered on the impacts of social stress, social

control, and social support on participants' lived experience of insomnia. Most of the major and minor themes identified in this paper did not support findings from previous studies examining social ties among Latinx adults suggesting that social processes may serve as simultaneous sources of risk and protection against poor health outcomes.[40,156] Instead, for the most part, the social processes impacted insomnia symptoms in the expected direction (i.e., social support was associated with improved sleep), with one exception. Some participants described their spouses/romantic partner's attempts to provide social support as sources of conflict and social stress. Taken together, these findings highlight the embeddedness of insomnia within the social context. They also suggest that it may be important to address the ways in which social relationships impact insomnia symptoms and vice versa as part of psychological treatments for this sleep disorder.

Topic 1: Social processes as predisposing, precipitating, and perpetuating factors of insomnia

Consistent with models describing the pathogenesis of insomnia,[56,157,158] social stress was a very prominent precipitating and perpetuating factor of this sleep disorder in participants' narratives. All three types of social stress reflected in the themes have been associated with worsening insomnia symptoms in previous studies. The cognitive processes of worrying and rumination described by participants have been consistently, positively associated with increased insomnia symptoms.[55,58,60,159] While worry and rumination in these studies have mostly focused on the individual's ability to fall asleep,[55,58,154] the Latinx participants in this study described ruminating about painful memories of others and tense interactions they had with family members. Participants also described worrying about their families', friends', and others' wellbeing. Notably, worries and ruminative thoughts were about family ties more often than other type of social ties.

This finding is consistent with the central role of family ties emphasized in the Latinx cultural value of familismo.[25,46] Although elevated mental preoccupation with one's sleep is a common symptom of insomnia,[2,55] these narratives suggest that among Latinx adults with chronic insomnia, perseverative thoughts may be centered on others instead of themselves and their sleep problems.

The themes of loneliness, particularly due to separation from family during migration, and ethnic discrimination highlight unique social stressors that impact insomnia among Latinxs. Previous studies conducted among population-based, nationally representative samples of Latinx adults have demonstrated that ethnic discrimination is significantly associated with increased insomnia symptom severity.[49,160] Additionally, there is a large body of evidence supporting the positive association between loneliness and insomnia symptoms among majority non-Latinx White samples.[161] This loneliness may be exacerbated among Latinx adults who may not be able to contact or visit their families in their countries of origin as often as they would like for a variety of reasons, such as financial constraints. Future studies should explore the specific influence of transnational ties, migration, loneliness and insomnia symptoms among Latinx adults. Studies should also explore Latinxs' perspectives on the association between loneliness and insomnia, knowing that studies have demonstrated they are bidirectionality related.[161]

In addition to the influence of social stress on insomnia symptoms, there was also consensus among participants identifying social control as a precipitating and perpetuating factor of insomnia symptoms. Participants described the ways in which the sleep habits of spouses/romantic partners, family members, neighbors, among others disrupted their ability to sleep during the night. Previous studies have found similar influences within the family context.[162–164] One study conducted among non-Latinx White and African American families made up of a mother, a father, and one or more children demonstrated that the mother's objectively measured

sleep duration and quality on a given night were significantly influenced by the child's and father's sleep duration and quality that night.[163] Specifically, in this study, Kouros & El-Sheikh[163] found that longer sleep duration and higher levels of sleep efficiency among fathers and children one night were significantly associated with longer sleep duration and higher levels of sleep efficiency among mothers that same night. The mother's sleep schedule was also significantly associated with the father's and child's sleep schedule that night. It is important to note that although focus group participants' descriptions may have only included the negative effects of others' sleep habits on their sleep, social control could also be associated with improve sleep outcomes as demonstrated by Kouros and El-Sheikh.[163] Focus group participants may have only highlighted negative effects because all participants were experiencing chronic, moderate to severe insomnia. Future studies should evaluate the potential positive and negative influence of others' sleep habits on sleep quality among those experiencing low levels of clinical insomnia symptoms.

Topic 2: Social processes' impact on coping with insomnia

Although a large body of evidence indicates that, in general, social support is associated with improved mental and physical health, there may be instances when social support is not perceived as helpful by individuals experiencing distress.[165–167] In this sample, participants described helpful and unhelpful social support provided to them by family members, spouses/romantic partners, friends, among others. Participants tended to describe social support as being helpful when others recommended products and behaviors to improve sleep, such as drinking tea or meditating. Several participants described instances when attempts to provide support or express concern over their insomnia symptoms made them feel more distressed or helpless over their insomnia. Previous studies conducted among individuals with serious medical conditions, such as cancer and heart conditions, found similar sentiments when participants

described unhelpful forms of social support from partners, friends, and family.[165,166] In these studies, participants described perceiving social support as unhelpful when their loved ones minimized the seriousness of their condition, provided unsolicited advice or advice without an implementation strategy, and criticized participants behaviors and attitudes toward their illness.[165,166] These descriptions parallel the experiences of participants in this sample who expressed frustration at being told by spouses/romantic partners and others to go to bed at certain times or get more sleep without providing tangible ways to so. These narratives suggest that educating the loved ones of individuals suffering from insomnia on ways to provide helpful social support may be an important step in treating this sleep disorder.

In addition to describing social support that specifically addressed their insomnia symptoms, several women in this sample mentioned receiving advice from loved ones to improve their overall mental health. Specifically, women described loved ones suggesting they reduce the amount of time they spend making sure others are happy. Even during the focus group discussions, participants interjected in one another's stories reinforcing the idea that participants needed to care more for themselves. These interactions reflect previous studies identifying the unequal distribution of household and caregiving responsibilities as a potential explanation for the increased prevalence of insomnia among women when compared to men.[168,169] Although the discussion on this topic was expansive, it was only present in an all-women focus group. Women may feel more comfortable expressing these sentiments among others who share similar life experiences due to their shared gender identity. Future studies among gender-specific focus groups are needed to explore this topic further.

Topic 3: Effect of insomnia on social relationships

In addition to demonstrating the ways in which social tie domains influenced the lived experience of insomnia, the focus group discussions highlighted how insomnia symptoms affected social relationships. Participants attributed the tension and discomfort that they felt in their relationships with spouses/romantic partners, family members, and co-workers, in part, to their insomnia symptoms. These descriptions are corroborated by findings from quantitative studies conducted among romantic couples which demonstrated that poor sleep quality was inversely associated with relationship satisfaction.[120,170] The association between insomnia and increased interpersonal conflict is logical given that people suffering from insomnia often express feeling irritable which may increase the likelihood of negative social interactions.[2,171] In the majority of examples participants shared, interpersonal conflicts arouse at bedtime when participants did not go to sleep with their spouses/romantic partners. These descriptions demonstrate how several social processes influence the lived experience of insomnia. Participants' spouses/romantic partners often initiated the conversation expressing concern over the sleep problems of the participants, displaying social support. In their attempts to support their partners, they encouraged them to go to sleep at a certain time, exercising social control over their partners. However, the participants felt frustrated by their spouses/romantic partners and an argument ensued, indicating the presence of social stress. Other participants recounted feeling uncomfortable at night because they did not want to disturb their spouses/romantic partners by getting out of bed or doing an activity until they could fall back asleep. These narratives are an example of the relationship between social control and social stress in the context of insomnia.

To completement and confirm these qualitative findings, future studies should explore how spouses/romantic partners and other loved ones of individuals with insomnia experience the effects of insomnia on their relationships. Additionally, given that social stress and insomnia symptoms

may create a positive feedback loop which may maintain and exacerbate insomnia, studies should examine the reciprocal relationship between these factors. If these findings are confirmed, adapting psychological treatments for insomnia to incorporate elements of interpersonal therapy, a type of psychotherapy that addresses problem areas in interpersonal relationships as a means of supporting mental health,[91] may enhance the effectiveness of these treatments by addressing the social environments contributing to insomnia symptoms. Specifically, interpersonal therapy could help identify and address conflicts relating to relationship expectations of sleep behaviors, such as going to sleep at the same time as a spouse, that may be contributing to an individual's insomnia symptoms. Lastly, given that participants described the negative effects of insomnia on their relationships as one of the motivators for seeking insomnia treatment, future studies should test whether improvements in insomnia symptoms are associated with improved relationship satisfaction.

Gender differences

As suggested by previous studies documenting gender differences in the association between social processes and health outcomes,[40,42,136] gender differences in how social processes influenced the lived experience of insomnia were present in the focus group transcripts. The main differences between women and men's descriptions centered around caregiving as a precipitating and perpetuating factor of insomnia among women. Additionally, women cited their social identities as women and mothers as contributing to their insomnia symptoms. These descriptions coincide with studies conducted among Latina women demonstrating that increased endorsement of marianismo, which refers to the cultural gender role expectations of women to be nurturing, self-sacrificing, and subservient,[72,172] particularly regarding women's role as the primary caregivers of the family, were associated with poor mental and physical health outcomes.[72,82]

However, literature examining the association between marianismo and health outcomes is very limited. The few differences noted may be due to the overrepresentation of women in the sample. Future studies may benefit from using mixed methods to explore the level of endorsement of cultural gender role expectations may shape the influence of social processes on the lived experience of insomnia among Latinx women and men.

Limitations

There are several limitations to this qualitative study relating to the study design that may affect the generalizability and interpretation of the findings. First, because the original study's focus was not on exploring the effects of social processes on the lived experience of insomnia, questions specifically probing for this association were not included in the focus group interview guide. A study incorporating targeted questions exploring participants' perspectives on the influence of social processes on their sleep may prompt richer conversations on the subject. Additionally, focus group participants were only eligible to take part in the study if they were actively experiencing moderate to severe insomnia symptoms. This characteristic may have biased the discussions to focus on the ways in which social processes worsened insomnia symptoms. Future studies conducted among participants at different stages in their insomnia diagnosis (e.g., acute, chronic, in treatment, and in remission) may yield positive and negative ways in which social processes influence the lived experience of insomnia. Lastly, due to time and resource constraints, a member-checking phase was not conducted to corroborate the topics and themes identified in the thematic content analysis. Although conducting a member-checking phase may have strengthened the credibility of the results presented in this paper, this limitation was reduced by incorporating an additional transcript coder who had not participated in the facilitation of the focus groups or the development of the research question. The excellent interrater agreement

achieved during data analysis lends credence to the themes extracted from the focus group transcripts. Future studies should incorporate a thorough and iterative member checking phase as a validation technique to support the themes identified by researchers.

Implications

Despite this paper's limitations, it is among the first qualitative studies to explore the influence of social processes on the lived experience of insomnia among Latinx adults. The themes brought forth from six focus group transcripts conducted among English- and Spanish-speaking Latinx adults with chronic insomnia highlight the complex connection between social ties and the lived experience of insomnia. These findings suggest that among Latinx adults, it may be important for psychological treatments for insomnia to address the ways in which social processes contribute to insomnia symptoms. Specifically, evaluating an individual's social environment may allow mental health providers to incorporate aspects of interpersonal psychotherapy[173,174] to psychological treatments of insomnia to reduce the negative effects and enhance the positive effects of social ties on sleep. To extend this concept further, as previously suggested by Rogojanski et al.,[31] inviting loved ones to take part in an individual's treatment for insomnia or encouraging patients to educate those close to them on their condition and treatment plan to garner their support may be particularly beneficial in treating insomnia among Latinx adults. In sum, the findings from this paper suggest that addressing influential social processes such as social stress and social control in addition to an individual's unhelpful thoughts, behaviors, and beliefs about sleep may be a more holistic approach to improving the sleep health of Latinx adults.

Table 1.1

Sociodemographic and Insomnia Symptom Characteristics of Latinxs participating in CLIO (n=35)

	All (n=35)		Women (n=22, 62.86%)		Men (n=13, 37.14%)	
	N/M	%/SD	N/M	%/SD	N/M	%/SD
Age, y	65.43	12.63	64.86	12.70	66.38	12.96
Nativity Status						
Immigrant	27	77.14%	18	81.82	9	69.23
U.S.-born	8	22.86%	4	18.18	4	30.77
Country of origin or heritage						
Chile	1	2.86	0	0	1	7.69
Colombia	2	5.71	1	4.55	1	7.69
Cuba	1	2.86	0	0	1	7.69
Dominican Republic	17	48.57	14	63.64	3	23.08
Ecuador	1	2.86	0	0	1	7.69
Italy	1	2.86	1	4.55	0	0
Mexico	4	11.43	1	4.55	3	23.08
Peru	1	2.86	0	0	1	7.69
Puerto Rico	6	17.14	4	18.18	2	15.38
Venezuela	1	2.86	1	4.55	0	0
Language of focus group						
English	9	25.71	2	9.09	7	53.85
Spanish	26	74.29	20	90.91	6	46.15
Language Fluency						
Spanish only	14	42.42%	11	52.38	3	25.00
English only	3	9.09%	2	9.52	1	8.33
Bilingual	16	48.48%	8	38.10	8	66.67
Missing	2	5.70%				

	All (n=35)		Women (n=22, 62.86%)		Men (n=13, 37.14%)	
	N/M	%/SD	N/M	%/SD	N/M	%/SD
Educational Attainment						
Less than High School	6	17.14	5	22.73	1	7.69
High school diploma or GED	11	31.43	8	36.36	3	23.08
Trade School/ Vocational School	2	5.71	1	4.55	1	7.69
Some College	6	17.14	4	18.18	2	15.38
College graduate or Graduate degree	10	28.57	4	18.18	6	46.15
Insomnia Severity Index Score (min 15, max 27)	20.6	3.44	20.32	3.68	21.08	3.07

Figure 1.1

Major and Minor Themes Identified across Three Topics Demonstrating the Influence of Social

Processes on the Lived Experience of Insomnia among Latinx adults
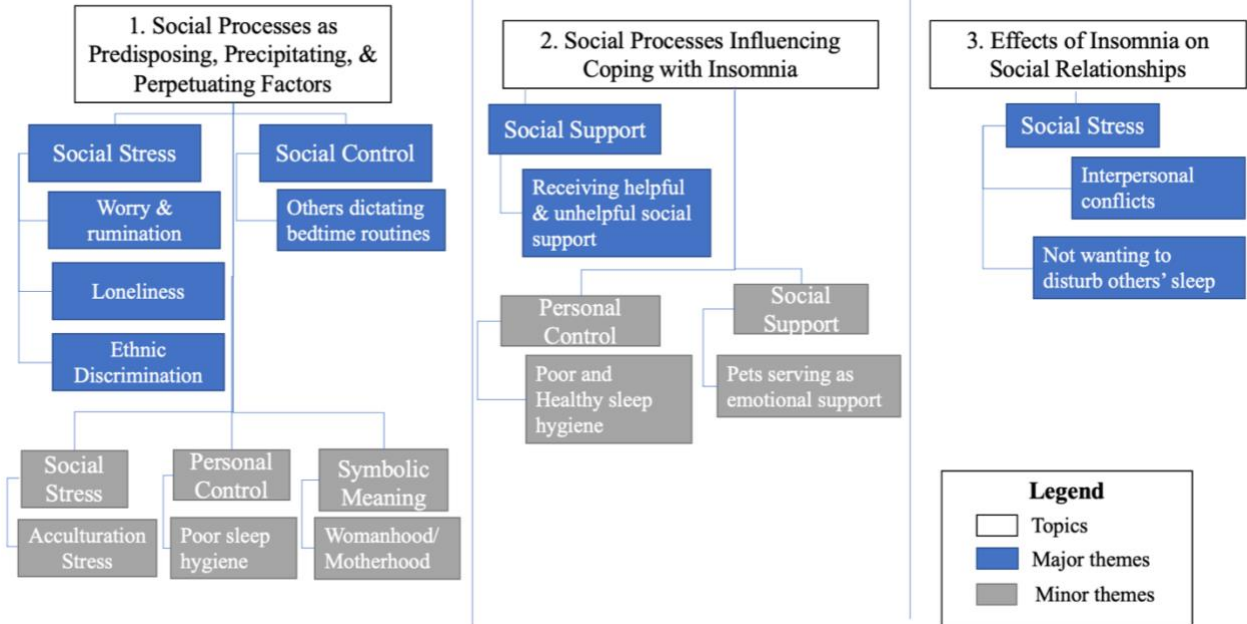
Table 1.2

Examples of Quotations of Major and Minor Themes across Three Topics Demonstrating the

Influence of Social Processes on the Lived Experience of Insomnia among Latinx adults

Social Processes	Themes	Influential Social Tie Domains	Illustrative Quotes
Social stress	Worry and rumination about other's problems	Family	F2(ES): In my case particularly, I know that first of all, I cannot separate the negative things that happen to me during the day, I can't dissociate with them at night. So, for example, at this moment I am having a lot of issues with my son. He is in Colombia, but I have problems with him. So, I spend all night, eh, thinking about what I'm going to say to him when I go back to Colombia, and I write it…
		Work	M1(ES): Um, for me at least, I started an anxiety, depression, at work. I mean, I don't know when it [insomnia] came, but it was due to work. And I think this is how it happened, because at work I had to—the supervisor would say, "Np, you have to go this other thing." And I would say, "But how? I am doing something else and now I have to do something else?" "No, no you have to do to this." And you know, where a captain rules a sailor has no sway. So, I couldn't contradict him. So, I would stop doing one thing and the next day I would do the same thing, the same work. A lot of tasks were pending and- and my head was like this that I couldn't take it anymore. And I

Social Processes	Themes	Influential Social Tie Domains	Illustrative Quotes
			would go to that, I would go home with all the burden of work and the problems at home, on top of the problems at work, I think little by little, that eat away at me until, like a glass filling up with water until it overflows. And that's when it seems that anxiety of the depression gripped me and form there I started [with insomnia symptoms].
	Loneliness	Family/Spouse	M1 (EN): And for me a big one has to do with, uh, loneliness, um I recently got divorced three years ago, and, um, that's a big issue for me, not being with my wife, my kids are in North Carolina
		Family	M6 (ES): In general, all the things affect me, for example mid-life crisis… But in particular de fact of… of being separated from family members of so much time…The lack of company… the fact of being alone.
		Spouse/Friends	F3(EN): I mean, this thing of waking up at 2:00, 3:00 in the morning, it's, like you know my husband is sleeping, here I am, you know, reading a book or the TV, the computer, 7:00 I'm doing my laundry, 8:00 I'm in the supermarket… everyone else is sleep, you know? All my friends, "Oh, I'm sleeping," you know?
	Ethnic discrimination	Others	F5(ES): Because one is alert to what else he [President Trump] will put into effect. I mean, my family, thank God, my daughter with whom I live with is a

Social Processes	Themes	Influential Social Tie Domains	Illustrative Quotes
			citizen, her children were born here. The other one is in the processes of becoming a resident and I am a legal resident. I mean, directly it doesn't affect me, but with all the new things he says, and he says he is going to do and that for Dominican their status will change, how do you call it? The residence to a visitor's visa.... It keeps me awake the attitude of the president.
Social Control	Others impacting bedtime routines and sleep habits	Family	F4(EN): I think that [the insomnia symptoms] started because, actually, all my family, it seems like they have insomnia, too. They were always up all night, and I was the only one who was going to school, so then I kind of had that sleep schedule that there is no sleep. [So], now I try to fall asleep, I lay there, there's so many thoughts I can't turn off my brain off, I keep thinking.
		Neighbor	F1(EN): I actually have a neighbor that works at night, I believe he works in a club, so his hours are just all over the place and when I finally am getting to sleep, about five or so, that's when he's coming in and he's making noise and he's, you know, throwing his shoes on the floor, and- so that's another- another factor, to, you know, when I'm trying to get back to sleep, and he's just starting his day pretty much and he's just noisy- so that contributes to- to it.

Social Processes	Themes	Influential Social Tie Domains	Illustrative Quotes
Social Stress	Acculturation Stress	Family	F5(ES): For me, it's the change in culture once one is older, it's- there are many customs that I can't adapt to. And there are behaviors that I hear, "How can this be happening in my family?". So, that, I think that those are the things that contribute to one staying awake.
Personal control	Poor sleep hygiene	Self	F3(ES): But I think that influences, like she said, the bad habits. An example, I eat late. I eat late. And sometimes, when I eat something heavy. "This, this night call it quits, there will be no sleep." And I know, I know.
Symbolic meaning	Womanhood/Motherhood	Family	Speaking about what gets in the way of sleep… F3(ES): It's because as a woman, we were taught since we were young to do everything at home. When the man can wash dishes, he can help wash clothes, he can change a diaper and we let him sit there and what TV or go play sports. They are with friend instead of helping us. It's all of that.
Social Support	Receiving helpful and unhelpful social support	Family	F4(EN): The very first thing my dad introduced me to was warm milk at night. F3 (ES): I have drunk teas. My mom says, "Drink linden tea" and that doesn't do anything for me.
		Spouse	F1(EN): I would, too. I mean, it's- I just thought of my husband as he tries to get me to go to bed at a certain time and I feel like it's a parent telling a little child, you need to be right now, so…

Social Processes	Themes	Influential Social Tie Domains	Illustrative Quotes
Social support	Pets serving as emotional support	Pets	F6 (ES): I take small naps and when I see I stay like that [awake] all night long, I drink tea or milk, and I continue the night like that. And I sip or I watch TV, or I play with the baby [the dog] and like that. The dog helped me feel calm
Personal control	Poor and healthy sleep hygiene behaviors	Self	M2 (EN): Actually, I also do the same, like I'm watching TV, I put the sleep, uh, thing and that's how I fall asleep usually, but recently I've been trying to sleep more with the lights off and everything.
Social Stress/Social support/Social Control	Interpersonal Conflicts	Spouse	F3 (ES): I started to have problems with my husband. Not serious problems that, let's say, affected our relationship as a couple in that way, but yes of feeling a certain discomfort, because, I don't know, but most of you know all of the things that come along with menopausal symptoms, which is what I had in the moment. Those hot flashes started that I don't have anymore. I don't know, a lot of situations that those hormonal changes bring about. So, sometimes our partners don't understand the situation and so what they see is, "Ay, why do you have to go to bed so late? You really go around in circles."
	Not wanting to disturb others' sleep	Spouse	F1 (EN):I don't stay in the bed, I actually get up and go to the bathroom, so I don't disturb my husband, and like you said a learned behavior…

Social Processes	Themes	Influential Social Tie Domains	Illustrative Quotes
		Spouse/ Romantic partner	M2 (ES): When [my partner] sees that I am awake, they say "Turn the TV on, distract yourself," they say. Uh, that's what I do, but I feel uncomfortable that I am robbing them of their sleep. And this isn't something that is one month, or one week, this has been going on awhile. The next day, I see that the other person leaves, they wake up, do their normal routine, and I see they are tired. Meaning, because they support me, they are being affected.

Paper 2

Independent and Synergistic effects of social support and social strain on insomnia symptoms among Latinx women and men

Introduction

      Insomnia is a highly prevalent[1,2] psychiatric disorder associated with poor sleep quality, including problems falling or staying asleep.[2] This disorder not only affects the health of individuals by increasing the risk of developing depression, anxiety,[7,175] and cardiovascular diseases,[5,13] but also places significant burdens on society and the economy through increased healthcare costs[176] and loss of productivity.[9,176] Widely referenced models of insomnia describe the pathogenesis of this disorder as a combination of predisposing, precipitating, and perpetuating factors.[140,141,177] Predisposing factors include characteristics and/or traits that increase the risk of developing insomnia.[140] Precipitating factors can be positive or negative events or circumstances associated with the initiation of insomnia symptoms.[140] Perpetuating factors are patterns of behavior that maintain insomnia symptoms even after precipitating factors are no longer present or perceived as distressing.[140] Although these models acknowledge that the sources of predisposing, precipitating, and perpetuating factors of insomnia can be found across individual, social, and societal levels, insomnia research has mostly focused on individual behaviors without examining the contextual factors that may shape those behaviors.[141,178,179] Additionally, although insomnia affects 19.3% of Latinx adults living in the US,[1] the predisposing, precipitating, and perpetuating factors of this psychiatric disorder remain very understudied in this population.[180] Identifying potential risk and protective factors in the development and maintenance of insomnia

is key to advancing health equity among Latinx adults given that this disorder is associated with negative mental and physical health outcomes[5,7,13,181,182] and high economic and societal costs.[9,176]

Recently, sleep health research has expanded to examine social factors, such as social ties, as potential sources of risk or protection against the predisposing, precipitating, and perpetuating factors of insomnia. However, given that social ties can be simultaneous sources of social support, generally considered a protective factor,[100,101,183–189]and social strain, generally considered a risk factor,[189–192] further research is needed to examine how the co-occurrence of social support and social strain affect insomnia symptoms, particularly among Latinx adults.

Social ties and health

The influence of social ties on health has been well documented over several decades with studies demonstrating beneficial and detrimental effects on health outcomes and overall mortality.[68,100,101,189] Researchers generally describe social ties through their two main components: structure and content.[189] Structural aspects of social ties include measures of the quantity of social ties, or links, between people, while social ties content refers to the quality of social ties. The content of social ties is commonly assessed through content features of social ties, such as social support or social strain.[189] Social support, defined as the "emotionally sustaining qualities" [189] of social ties, has been associated with improved psychological and physical health outcomes.[100,101,183–189] While, social strain, defined as demands from social ties that exceed one's ability to cope or are physically or emotionally taxing,[107,189] has been associated with increased risk of poor health outcomes[189–192] and an increased risk of overall mortality.[101] Although most studies have tested the independent effects of social support and social strain on health, these two content features of social ties often co-occur, meaning individuals may experience social support and social strain simultaneously from the same or multiple social tie domains, such as family and

friend social ties.[139] For example, individuals who endorse receiving social support from friends may also experience social strain if they feel indebted or obligated to reciprocate the support they receive but are unable to do so for a variety of reasons including limited time or resources.[193] This co-occurrence may have important implications for accurately capturing the complexity of social ties and their impact on health and identifying social ties that may be particularly beneficial or detrimental to health.

Some studies have proposed that social support and social strain have synergistic effects on physical and mental health outcomes, meaning that the combination of social support and social strain affect health differently than when examined separately.[44,194] The majority of these studies have been based on the "reverse buffering"[139] and stress buffering models.[139,194] The reverse buffering model posits that the stress produced by social strain may be exacerbated when co-occurring with social support, particularly when both high levels of social strain and social support originate from the same social ties. Social ties that are characterized by high social support and high social strain are generally known as ambivalent social ties.[44,139,194,195] Although the association between ambivalent social ties and health outcomes has been somewhat inconsistent, several studies have demonstrated that these types of social ties are associated with worse cardiovascular health, mental health, and overall wellbeing when compared to high-quality, low-quality, and indifferent social ties.[44,194] High-quality social ties are defined as providing high levels of social support and low levels of social strain. Low-quality social ties are characterized by providing low levels of social support and high levels of social strain. Indifferent social ties are defined as co-occurring low social support and low social strain.[44,194] An opposing model, the stress-buffering model, suggests that social support attenuates or eliminates the negative effects of social strain.[44,139,189,194] For example, a study among patients with rheumatoid arthritis found that

those who reported problematic support, defined as receiving information that was unhelpful or upsetting or feeling misunderstood, reported less depression if they also reported having greater positive support, defined as feeling listened to, supported, and understood, suggesting that positive support buffers the negative effects of problematic support.[196] Although these theories suggest opposing, synergistic effects of social support and social strain on health, they capture the complexity of social ties as simultaneous sources of risk and protection through attenuating and exacerbating stress.

Whether the synergistic effects of social support and social strain are detrimental or beneficial to health may depend on the cultural values of individuals. For example, the effects of family social strain on health may be exacerbated among Latinxs who report high family social support and social strain because family social strain is discordant with the cultural value familismo [familism], a cultural value that emphasizes close, harmonious family relationships.[25] Examining the synergistic effect of social support and social strain is essential to comprehensively understand how complex social ties affect health and to inform relationship interventions that promote good health;[45,69,139] however, the synergistic effects of social ties are understudied, particularly among Latinx adults.

Social Ties and Latinx Health

To date, the social ties and Latinx mental health literature has mostly focused on examining the independent effects of social support and social strain on health across different social tie domains, such as family ties or friend ties. Family social support has been consistently associated with increased likelihood of reporting excellent mental health and decreased risk of depression and anxiety.[38,80] Contrastingly, family social strain has been associated with a decreased likelihood of reporting excellent mental health and an increased risk of experiencing depression, anxiety, and

psychological distress,[38,39,80] largely corroborating the relationships found in majority non-Latinx White samples.[100,101] However, contrary to previous research demonstrating a positive association between friend social support and health promoting behaviors among non-Latinx White samples,[183] one study found that friend social support was associated with increased odds of current smoking status among Latina immigrant women.[40] The inverse relationship was found for Latino immigrant men with those reporting higher friend social support having lower odds of reporting current smoking status.[40] These findings suggest that the relationship between social support and social strain and health outcomes may differ by social tie domain and gender among Latinx adults.

The emphasis on maintaining close, warm, and harmonious relationships promoted in the Latinx cultural values of familismo [familism], which privileges close, interdependent family relationships, and simpatía [agreeableness], which underscores the expression of positive emotions and avoidance of negative ones in social interactions may enhance the stress buffering effects of social support or exacerbate the negative effects of social strain as suggested in the reverse buffering model.[25,44,139,194] Although to date no study has explicitly tested these effects among Latinx adults, some studies have alluded to the synergistic effects of family social support and family social strain on Latinx mental health outcomes. A study conducted among Latina women found that family support and family cohesion attenuated the statistically, significantly positive association between family burden and conflict and psychological distress among Latina US-born women.[39] Other studies, however, suggest that when conflicts arise within social ties among Latinxs, particularly high-quality social ties, the emphasis on positive emotions and warm relationships ingrained in familismo and simpatía may increase the perception of threat of conflicts and overshadow the health benefits generally associated with social support by increasing stress.[197]

These synergistic effects may be especially present among Latina women, because of cultural gender role expectations, generally referred to as marianismo, that emphasize relational traits such as self-sacrifice and caregiving as central to a Latina woman's identity.[198] When observed rigidly, these traits imply that the ideal Latina woman is responsible for others' wellbeing and should be willing to support and care for others before taking care of herself.[198] Studies have demonstrated that higher endorsements of these gender role expectations among Latina women and Latino men are associated with negative mental health outcomes including elevated depression and anxiety.[72,73] Although not tested directly, these studies suggest that a strict adherence to marianismo is associated with poorer mental health outcomes because these gender roles expectations may be too socially demanding.[72,73] While close adherence to the Latinx cultural values of familismo and simpatía which emphasize social support as an essential component of social relationships may promote health among Latinx adults, it may also increase the detrimental effects of social strain on Latinx health, particularly when these cultural values intersect with a rigid understanding and adherence to the cultural gender role expectations placed on Latina women.

Social ties and Sleep Health

Sleep health and social ties research has focused mostly on examining the association between social support and various sleep outcomes.[30] A meta-analysis of 61 studies conducted among majority non-Latinx White samples found that increased general social support was associated with lower insomnia symptoms.[30] Studies examining specific sources of social support, such as partners, family, and friends, have also found that social support is associated with reporting fewer insomnia symptoms and fewer sleep complaints. A recent study in a large sample of US adults found that those who reported intermediate to high social support from their partner

were at lower risk of reporting insomnia related sleep complaints, such as difficulty falling asleep, staying asleep, or not feeling rested the next day.[199] Similar results were found when examining family and friend social tie domains.[199] Those who reported high social support from other family members or friends, had a lower risk of reporting one additional sleep complaint when compared to those who reported low social support.[199] In this study only 3.3% of sample did not identify as White.[199] Sleep and social ties research indicated that general perceived social support and family, friend, and partner social support may play an important role in reducing insomnia symptoms and achieving healthy sleep.

Although the importance of examining the synergistic effects of social support and social strain on health have been underscored for decades,[45,69,139] only two studies on social ties and sleep disturbances have explored these effects and only one study has directly tested these effects. In a sample of older adults, perceived social support was associated with better sleep quality while social strain was associated with worsening sleep quality in separate models. When Stafford et al.[122] included social support and social strain in the same model, the relationships between these social tie characteristics and sleep quality remained significant though they were slightly attenuated.[122] This findings suggests that social support and social strain may buffer each other's effects on sleep. In a study among middle-aged adults, Chung et al.[37] found that when simultaneously including social support and social strain in a model, social support, but not social strain, was significantly associated with sleep quality.[37] Social support was associated with improved sleep quality.[37] Social strain was only significantly negatively associated with sleep efficiency, measured objectively through actigraphy.[37] Lastly, in a large, national sample of adults, Ailshire and Burgard[43] tested the independent and synergistic effects of family social support and social strain on troubled sleep, defined as the frequency of experiencing trouble falling or staying

asleep in the past 30 days, two main insomnia symptoms. Similarly to Stafford et al.'s[122] findings, family social support and social strain were significantly, independently associated with troubled sleep in the expected direction.[43] Unlike previous studies, in models accounting for family social support when examining the relationship between social strain and sleep outcomes, only the relationship between family social strain and troubled sleep remained statistically significant, suggesting the negative impact of social strain on sleep may overshadow the positive impact of social support on this health outcome.[43] This is one of the only studies examining the synergistic effects of family social support and social strain on troubled sleep. Those who reported ambivalent family ties (i.e., high social support and high social strain), low-quality family ties (i.e., low social support and high social strain), and indifferent family ties (i.e., low social support and low social strain) had an increased risk of troubled sleep when compared to those with high-quality family ties (i.e., high social support and low social strain).[43] The group at the highest risk of reporting troubled sleep were those who reported having ambivalent family ties, supporting the "reverse buffering" effect previously described.[43] These findings suggest that varying combinations of high social support and high social strain may impact insomnia symptoms differently. However, more research is needed to confirm these synergistic effects of social support and social strain on sleep outcome.

Present Study

Although there is abundant evidence demonstrating the independent effects of social support and social strain on health, studies examining the synergistic effect of social support and social strain remain in their infancy, particularly in insomnia research. Social ties and sleep disturbance studies have mostly examined the association of social support and insomnia symptoms, while far fewer studies have examined the relationship between social strain and this

sleep outcome.[30,37,122] Only one study to date has explicitly tested the synergistic effects of social support and social strain on insomnia related symptoms.[43] Additionally, these studies have been conducted among majority non-Latinx samples, meaning that findings from these studies may not apply to the Latinx population. Latinx culture places a stronger emphasis on collectivist values that promote close, interdependent relationships, particularly among family members, when compared to European-American individualistic cultural values which privilege independence, which in turn may prioritize individual needs over those of social ties.[25,46,134] This cultural difference may lead to differential independent and synergistic effects of social support and social strain on insomnia among Latinx adults. To address the gaps in the literature, this study will first examine the independent effects of social support and social strain across two social tie domains (i.e., family and friend ties) on insomnia symptoms among Latinx adults living in the US. It is hypothesized that social support, particularly from family social ties, will be associated with a decreased prevalence of reporting insomnia symptoms and social strain will be associated with an increased prevalence of reporting insomnia symptoms. This paper's primary research questions will examine the synergistic effects of family and friend social support and social strain on the prevalence of experiencing insomnia symptoms in separate models. Considering the emphasis on warm and positive relationships in Latinx cultural values, it is predicted that ambivalent, low-quality, and indifferent family and friend social ties will be associated with an increased prevalence of experiencing insomnia symptoms when compared to high-quality family and friend social ties. Ambivalent social ties, particularly family social ties, will be associated with the highest prevalence of experiencing insomnia symptoms when compared to the other social tie quality categories.

Gender-stratified, exploratory analyses will examine how these relationships may vary between Latinx women and men. The relationship between social support and social strain across the two social tie domains and insomnia symptoms will be stronger among women than men. In line with the gender role ideals of marianismo, Latina women with ambivalent and low-quality social ties will demonstrate an increased prevalence of experiencing insomnia symptoms than those with indifferent or high-quality social ties.

Methods

Data Source and Sample

This study used a subsample of Latinx adults from the National Latino and Asian American Study (NLAAS)[200] to examine the independent and synergistic effects of two social tie domains of social support and social strain (i.e., family and friend ties) on insomnia symptoms among Latinx adults. NLAAS, a nationally representative study of Latinx and Asian adults living in the US, was conducted to document the prevalence of psychiatric disorders and the use of mental health services, and to examine the social, environmental, and psychosocial factors associated with this prevalence among Latinx and Asian adult populations.[200] A sample of 4649 Latinx and Asian adults selected using four-stage probability sampling completed the study interview.[201] The first and second stages of sampling selected counties and census blocks within the selected counties.[201] The third stage included selecting housing units from a list within the selected census blocks using a preselected sampling rate.[201] The selected housing units were contacted to conduct a screening survey.[201] Respondents were considered eligible to participate in NLAAS if they were eighteen years of age or older, lived in the continental US, Alaska, or Hawaii, were not institutionalized, and did not live on a military base. If the respondent disclosed that more than one eligible adult lived in the household, the adults were placed on a list and were randomly selected to participate

in NLAAS.[200] Of those who completed the interview, 2,554 identified as US-born and immigrant Latinx adults of Puerto Rican, Cuban, Mexican, or other Latin American heritage. This study included a subsample of Latinx adults who have experienced symptoms of depression in their lifetime for several days, two weeks, or longer (N=582) because this sample responded to inquiries about insomnia symptoms.

Measures

Family social support. To assess family social support, adapted questions from the Family Adaptability and Cohesion Evaluation Scale were used.[202] This scale is widely used and has been tested in epidemiological surveys of English- and Spanish-speakers.[39,40,203] Family social support was assessed with the following items: "How much can you rely on relatives who do not live with you to help you if have a serious problem?" and "how much can you open up to relatives who do not live with you if you need to talk about your worries?" Participants could indicate: A lot, some, a little, not at all, don't know. The family social support subscale has excellent psychometric properties in this sample (Cronbach's alpha=0.89).

Family social strain. Social strain from family social ties was measured using the following items from the Family Adaptability and Cohesion Evaluation Scale:[202] "How often do your relatives or children make too many demands on you?", "How often do your family or relatives argue with you?" Participants selected from the following answer choices: Often, sometimes, rarely, never. In this sample, family social strain had a Cronbach's alpha=0.86.

Friend social support. A subset of adapted measures from the Family Adaptability and Cohesion Evaluation[202] were used to assess friend social support. Similar to the items assessing family social support, the friend support measurements asked participants to report to what extent they could: 1) rely on their friends for help if the participant had a serious problem, and 2) open

up to their friends when the participant wanted to talk about their worries. Participants selected from four response options ranging from "A lot" to "Not at all" or "Don't Know." In this sample, these items have excellent psychometric properties as indicated by a Cronbach's alpha of 0.91 for friend social support.

Friend social strain. Friend social strain was assessed using two items from the Family Adaptability and Cohesion Evaluation[202] asking participants to report the frequency with which their friends: 1) demanded too much of the participant, and 2) argued with the participant. Participants indicated the frequency using a four-point scale ranging from "Often" to "Never" or could select "Don't know." These items had a Cronbach's alpha of 0.86 in this sample.

Insomnia symptoms. Insomnia symptoms were assessed with one item in the NLAAS survey. This item appears as part of the World Health Organization Work Mental Health Composite International Diagnostic Interview assessment for depression based on ICD-10 and DSM-IV diagnostic criteria.[200] Participants responded Yes/No to experiencing more trouble than usual initiating or maintaining sleep or waking up too early, key indicators of insomnia,[2] almost every night during the most severe period of several days to two weeks or longer of depressive symptoms.

Covariates. Self-reported age, gender, nativity status, Latinx heritage group, and psychological distress were included in the descriptive analyses and as covariates. Previous studies have demonstrated that older adults and U.S.-born Latinx adults have worse sleep outcomes than younger adults and immigrant Latinx adults.[204–206] Differences in sleep outcomes by Latinx heritage have been observed in a large community-based cohort study of Latinx adults.[207] Specifically, a significantly higher percentage of those of South American heritage reported excessive daytime sleepiness, a common symptom of insomnia,[207] when compared to those of

Mexican, Cuban, Dominican, Puerto Rican, and Central American heritage.[206] Female gender has also been associated with increased prevalence of insomnia when compared to male gender in majority non-Latinx White samples living in the US[2], however, this gender difference has not been found among samples of Latinxs adults.[48,206] The positive association between stress and insomnia symptoms has been well documented.[56,74,158,208] In these analyses, psychological distress was measured using a single item asking participants to report the severity of their emotional distress during their most severe depressive episode lasting two weeks or longer. This period corresponded with the period in which participants were asked about their experience with insomnia symptoms. Psychological distress was dichotomized into two levels: mild to moderate and severe to very severe based on the distribution of responses. To estimate the independent and synergistic effects of social support and social strain on insomnia symptoms more accurately, self-reported age, gender, nativity status, and Latinx heritage were included as covariates in all models. A final adjustment for psychological distress were made in sensitivity analyses for models testing the synergistic effects of family and friend social support and social strain.

Analytical Strategy

A complete case analysis was conducted with a total sample of N=573. A total of 9 observations were dropped from the sample of Latinx adults who had insomnia data due to incomplete data in exposure and/or covariates variables. Diagnostic analyses were conducted to review the distributions of all variables for outliers. Survey weights were applied to all analytical procedures to account for the probability sampling used in data collection. Descriptive analyses were conducted, and t-tests and chi-square analyses were used to examine any differences in socio-demographic or psychosocial measures between women and men.

Given that experiencing insomnia symptoms was not a rare occurrence in this sample (>10%), weighted Poisson regression analyses with robust error variance were used to test the independent associations of social support and social strain from two social tie domains (i.e., family and friends). This type of analysis was selected because it produces more accurate estimates and confidence intervals when compared to logistic regression analyses, which tend to overestimate the relationship between exposure variables and non-rare events.[209,210] In the first model, the association between family social support and family social strain and experiencing insomnia symptoms were tested adjusting for age, gender, nativity status, and heritage group. The second model examined the association of friend social support and friend social strain and experiencing insomnia symptoms accounting for age, gender, nativity status, and heritage group. The primary model included both family and friend social support and social strain to determine the independent associations of each social tie characteristic and experiencing insomnia symptoms. Multicollinearity tests revelated that family social support and social strain and friend social support and social strain could be included in the same model (mean VIF=1.17).

In this paper, the synergistic effects of social support and social strain are operationalized as the effects of the interaction between different levels of these two social tie characteristics. Based on the buffering and "reverse buffering" models previously described,[139,194] social support and social strain may amplify each other's effects on insomnia symptoms. Therefore, testing the interaction of these social tie characteristics, instead of testing the moderating effect of one on the other, captures the dynamic relationship between these characteristics and allows for the examination of their combined effects on the prevalence of experiencing insomnia symptoms. The synergistic effects of social support and social strain on insomnia symptoms for each social tie domain (i.e., family, friend) were tested using a priori categories identifying different

combinations of social support and social strain. Following Ailshire and Burgard's[43] methods, indicator variables for high social support and high social strain were created using median scores as the cut-offs differentiating high versus low social support and social strain for each social tie domain (i.e., family and friend). These indicator variables were combined to form a social tie quality categorical variable with four levels (ambivalent, indifferent, low-quality, and high-quality ties) (Figure 2.1). High-quality ties served as the reference category in the analyses. First, a model testing the synergistic effects of family social support and family social strain were tested using Weighted Poisson regression analyses with robust error variance. This model included adjustments for age, gender, nativity status, and heritage group. A second model was fitted to examine the synergistic effects of friend social support and friend social strain accounting for age, gender, nativity status, and heritage group. The primary model for this analysis examined the synergistic effects of family social support and social strain and friend social support and social strain adjusting for the covariates previously mentioned. Lastly, to explore the differences in these relationships between men and women, these models were conducted again stratified by gender.

[Insert Figure 2.1]

Sensitivity Analyses

Previous research has demonstrated a strong relationship between psychological distress and poor sleep quality.[211–213] Thus, sensitivity analyses were conducted to account for the confounding effects of psychological distress when examining the synergistic effects of family and friend social support and social strain on the prevalence of experiencing insomnia symptoms.

Power Analysis

Based on prior research that conservatively suggests a medium effect size between family social support and social strain and weekly/daily troubled sleep among majority non-Latinx White

adults,[43] I conducted a power analysis using G*Power to compute the required sample size. Given $\alpha = 0.05$, 0.80 power, and an expected odds ratio of 0.76 (SE=0.07), based on previous research,[43] a sample size of 510 participants would be required, using a weighted logistic regression model to capture the effect of social support on the odds of experiencing insomnia symptoms. To be adequately powered (0.80) to test the effect of social strain on the odds of experiencing insomnia symptoms using weighted logistic regression analyses, given $\alpha = .05$ and expected odds ratio of 1.49 (SE=0.15), a sample size of 249 is required. This study is adequately powered to detect the effect of social support on experiencing insomnia symptoms (0.84) and the association between social strain and experiencing insomnia symptoms (0.99). The synergistic effects assessed through a four-level categorical variable require a sample size between 136 and 499 to be adequately powered (0.80) to capture these effects on experiencing insomnia symptoms. This range in sample sizes is based on odds ratios of 1.32 (SE=0.22), 1.34 (SE=0.24), and 1.74 (SE=0.26) as reported in Ailshire and Burgard.[43] While exploratory gender-stratified analyses for the independent and synergistic effects of social support and social strain are underpowered for Latinx men (n=190), these analyses are adequately powered to test these effects among Latinx women (n=383).

Results

Descriptive Statistics

As shown in Table 2.1, this sample of Latinx adults participating in NLAAS included 62.00% women and 38.00% men with an average age of 38 years (SE=14.28). The majority of participants received less than a high school education (42.63%) while a minority received a college degree or higher (12.89%). About one half of the sample migrated to the US (49.81%) and reported being of Mexican heritage (52.62%). The average scores of family social support and family social strain were 6.19 (SE=1.98) and 4.45 (SE=1.71), respectively. For friend social

support and social strain, the average scores were 5.49 (SE=2.15) and 3.36 (SE=1.39). The majority of family social ties and friend social ties fell under the "Ambivalent quality" category (38.27%; 36.47%). For family social ties quality, the next largest category was "Low quality" (30.90%), followed by "High quality" (15.98%), and "Indifferent quality" (14.86%). Among the categories for friend social ties quality, "Indifferent quality" and "Low quality" were the next largest groups including 25.13% and 24.82%, respectively. The "High quality" friend social ties category was the smallest group with 16.58% of the sample included in this category. A large percentage of participants reported experiencing insomnia symptoms (80.00%). About half of the sample reported severe to very severe psychological distress (48.62%). There were no statistically significant differences between Latinx women and men across all variables, with the exception of age. Women were about 5 years older, on average, than men (Women: M=39.88, SE=14.92; Men: M=34.92, SE=12.61, p<0.001).

[Insert Table 2.1]

Independent and Synergistics Effects of Family and Friend Social Support and Family and Friend Social Strain on Experiencing Insomnia Symptoms

Results from weighted Poisson regressions with robust error variance did not demonstrate statistically significant independent effects of family social support or family social strain on insomnia symptoms in the primary model (PR=1.01, 95% CI: 0.98-1.04; PR=1.02, 95% CI:0.98-1.05) (Table 2.2). In the same model, a one unit increase in friend social support was marginally significantly associated with a 3% decreased prevalence of experiencing insomnia symptoms (PR=0.97, 95% CI=0.95-1.00, p=0.07). There were statistically significant differences in the prevalence of experiencing insomnia symptoms by Latinx heritage group.

[Insert Table 2.2]

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When examining the synergistic effects of family social support and family social strain using high-quality family ties as the reference category, indifferent, ambivalent, and low-quality family social ties were not statistically significantly associated with the prevalence of experiencing insomnia symptoms (Table 2.3). In model 2, which tested the synergistic effects of friend social support and social strain, low-quality friend social ties were associated with a 20% increased prevalence of experiencing insomnia symptoms when compared to high-quality friend social ties (PR=1.20, 95%CI: 1.00-1.44, p=0.05). In the primary model, the association between low-quality friend social ties and experiencing insomnia symptoms became marginally significant (PR=1.20, 95% CI: 0.98-1.46, p=0.07). As seen in independent effects models, those of Mexican heritage and All other Latinx heritage continued to demonstrate statistically significantly decreased prevalence of experiencing insomnia symptoms when compared to those of Puerto Rican heritage.

[Insert Table 2.3]

In gender-stratified models, among Latina women, although the overall model was significant (χ^2=17.41, p=0.03), indifferent, ambivalent, and low-quality family social ties were not statistically, significantly associated with experiencing insomnia symptoms (Table 2.4). When examining friend social ties among Latina women, indifferent friend social ties when compared to high-quality friend social ties were associated with a 35% increased prevalence of experiencing insomnia symptoms (PR=1.35, 95% CI: 1.02-1.79) in the primary model. In the same model, low-quality friend social ties when compared to high-quality friend social ties were associated with a 37% increased prevalence of experiencing insomnia symptoms (PR=1.37, 95% CI: 1.01-1.85). As seen in previous models, Latina women of Mexican and All other Latinx heritage continue to demonstrate a statistically significant lower prevalence of experiencing insomnia symptoms when

compared to those of Puerto Rican heritage (PR=0.82, 95% CI: 0.72-0.92; PR=0.77, 95% CI: 0.65-0.91).

Among Latino men, the overall model testing the synergistic effects of family social support and social strain was not statistically significant, therefore, the estimates were not interpreted (χ^2=6.69, p=0.06) (Table 2.5). The model testing the synergistic effects of friend social support and social strain was interpretable (χ^2=17.90, p=0.02). In this model, ambivalent friend social ties when compared to high-quality friend social ties were statistically significantly associated with 25% decreased prevalence of experiencing insomnia symptoms (PR=0.75, 95% CI: 0.61-0.93). The primary model including family social ties quality and friend social ties quality was not statistically significant; therefore, the estimates were not interpreted (χ^2=19.14, p=0.07).

Sensitivity Analyses

Sensitivity analyses were conducted to account for the potential influence of psychological distress on the synergistic effects of family and friend social support and social strain on the prevalence of experiencing insomnia symptoms. When adjusting for psychological distress in the aggregate sample, low-quality friend social ties compared to high-quality friend social ties continued to be marginally significantly associated with an increased prevalence of experience insomnia symptoms (PR=1.20, 95% CI:0.99-1.46) (Table 2.3). Among Latina women, the statistically significant associations between indifferent and low-quality friend social ties were slightly attenuated when controlling for psychological distress (PR=1.34, 95% CI: 1.02-1.77; PR=1.34, 95% CI: 1.00-1.80) (Table 2.4). The sensitivity analysis could not be interpreted among Latino men because the overall model was not statistically significant (χ^2=18.78, p=0.09) (Table 2.5).

Discussion

In this paper, the independent and synergistic effects of social support and social strain from two social tie domains (i.e., family and friends) on the prevalence of experiencing insomnia symptoms were examined in a sample of Latinx adults with a history of depression. Given findings from previous studies among majority non-Latinx White adults, it was hypothesized that family and friend social support would be associated with a decreased prevalence of experiencing insomnia symptoms while family and friend social strain would be associated with an increased prevalence of experiencing insomnia symptoms. However, there were no statistically significant independent effects of family or friend social support and social strain on insomnia symptoms. These findings contrast the consistent association between social support and improved mental health outcomes and social strain and poor health outcomes among Latinx adults.[38,214] In these Latinx health studies, the assessment of social support included two additional items (i.e., feeling cared for and understood) and four additional items measuring social strain (i.e., feeling criticized, disappointed, annoyed, and tense) which were not included in this dataset. [38,214] These measures may more accurately capture aspects of social support and social strain that influence insomnia symptoms. Therefore, future studies should measure various forms of social support and social strain from family and friends to examine their association with insomnia symptoms among Latinx adults. Future studies should also examine this association among other social tie domains previously found to influence mental health and sleep health, such as romantic partners and work relationships,[21,27,38,120,214] to capture how multiple social tie domains impact insomnia symptoms in this population.

The importance of examining the synergistic effects of friend social support and social strain was supported among Latina women. Low-quality (i.e., low social support and high social

strain) and indifferent friend social ties (i.e., low social support and low social strain) were significantly associated with an increased prevalence of experiencing insomnia symptoms when compared to high-quality friend social ties (i.e., high social support and low social strain) even when adjusting for psychological distress. These findings highlight that low friend social support, a shared characteristic of low-quality and indifferent social ties, may place Latina women at an increased risk of experiencing insomnia symptoms. Friend social ties characterized by low social support may increase perceptions of loneliness and isolation, which have been consistently associated with sleep problems in the general population.[161,215,216] Studies theorize that loneliness affects sleep by placing an individual in a state of heightened vigilance because the individual does not feel protected and secure from potential threats.[27,217] From an evolutionary perspective, the need to remain vigilant may become particularly acute at night to keep an individual from falling asleep, because while sleeping, individuals are unable to defend themselves from threats.[27,217] In practice, Latina women with low-quality or indifferent friend social ties may be more likely to ruminate and worry that they do not have someone to support them if a stressful event occurs. These forms of perseverative thinking may increase vigilance and promote cognitive and physiologic arousal impeding good quality sleep.[218,219] The findings also suggest that friend social ties may be particularly important among Latina women coinciding with previous studies examining the association between friend social ties and physical activity in a sample of Latina women and a sample of older women and men from diverse racial/ethnic backgrounds.[220,221] In these studies, social support, particularly from nonfamilial ties (i.e., friends), was central to positive health outcomes in these populations.[220,221] Contrary to the hypothesis and previous studies,[43] ambivalent friend social ties (i.e., high social support and high social strain) compared to high-quality friend social ties, were not associated with experiencing insomnia symptoms during

the most severe depressive episode in this subsample. This finding may suggest that social support and social strain may counteract each other's effects to the point that they are not associated with experiencing insomnia symptoms. Future studies should examine the synergistic effects of social support and social strain measured continuously on insomnia symptoms to better assess the reverse buffering and stress buffering reciprocal effects of social support and social strain. Taken together, these results suggest that the absence of friend social support, a common characteristic of indifferent and low-quality social ties, regardless of the social strain experienced, may be particularly harmful to Latina women's sleep health.

Among Latino men, the results suggest the opposite of what was hypothesized. Ambivalent friend social ties were significantly associated with a decreased prevalence of experiencing insomnia symptoms when compared to high-quality friend social ties. Perhaps, ambivalent friend social ties provide a protective effect against experiencing insomnia symptoms among Latino men because a mix of high social support and high social strain is consistent with close relationships and emblematic of the ideal Latino man.[222–224] In a qualitative study examining perspectives of masculinity among adult Latino men living in the United States, participants described social connection, exemplified by showing affection and supporting friends, and responsibility to others, by responding to their family's and friends' needs, as central to their identity as Latino men.[224] Another qualitative study among young Australian men describe close male friendships as including insults, argument, and emotional support.[222] Future studies would benefit from examining how perceptions of masculinity influence perceptions of social ties and their effects on health outcomes among Latinx adults.

Limitations

This paper is among of the first to examine the synergistic effects of family and friend social support and social strain on experiencing insomnia symptoms among Latinx adults. Although the data analyses for this study have several strengthens, including using a population-based nationally representative sample of Latinx adults and strong statistical methods, there are some limitations. The sample of Latinx adults included in the analysis have a lifetime history of depression. Based on cognitive models of depression, this sample of Latinx adults is more likely to perceive lower social support and be more sensitive to social strain.[225,226] Even though, as demonstrated in Table 2.1, family and friend social support was relatively high and social strain was relatively low in this sample, the effects of social support and social strain may not be generalizable to Latinxs without a history of depression. Future studies among Latinxs without a history of depression are needed to replicate these findings. Additionally, these studies should examine social support and social strain from other sources (i.e., spouse/ romantic partner and co-workers) and utilize a more comprehensive measure of insomnia, such as the Insomnia Severity Index,[70] to accurately capture how different social ties affect several important insomnia symptoms (daytime impairment, distress associated with insomnia symptoms, etc.). Lastly, the cross-sectional design limits the ability to test causality in the relationships between social support and social strain and the prevalence of experiencing insomnia symptoms. Future work should use longitudinal designs to test the temporal order in relationships between social support, social strain, and insomnia symptoms considering sleep health literature suggests there may be a bidirectional relationship between social ties and sleep health.[21]

Implications

The association between social ties and health is well established, however, few studies have examined the synergistic effects of social support and social strain on sleep health outcomes, such as insomnia symptoms. Findings from this paper suggest that only examining the independent effects of family and friend social support and social strain does not accurately capture the relationship between social ties and insomnia symptoms. The synergistic effects of social support and social strain in gender-stratified models suggest that evaluating positive and negative aspects of an individual's friend social ties may be central to determining the risk of experiencing insomnia symptoms in the Latinx adult population. Although these models need to be replicated using more robust measures of social support, social strain, and insomnia symptoms in a sample of Latinx adults without a history of depression, if these findings are confirmed, then the incorporation of elements of therapies aimed at managing the effects of social relationships on mental health, such as interpersonal psychotherapy,[173] may help strengthen the therapeutic effects of psychological treatments for insomnia, particularly among Latina women.

Figure 2.1

Visualization of Synergistic Effects of Social Support and Social Strain from Family and Friend
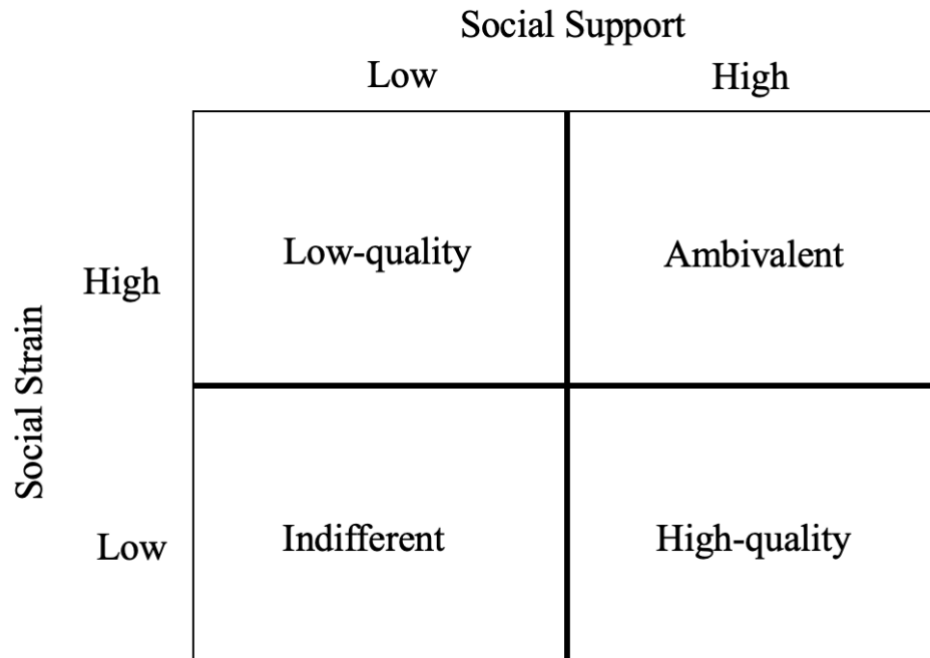
Social Ties

Table 2.1

Sociodemographic, Social Ties, and Mental Health Characteristics of Latinx adults with a lifetime history of a depressive episode (N=573)

	All (N=573)		Women (N=383, 62.00%)		Men (N=190, 38.00%)		X or F	P-value
	N^1/M^2	$\%^2/SE^2$	N^1/M^2	$\%^2/SE^2$	N^1/M^2	$\%^2/SE^2$		
Age, y	38.00	14.28	39.88	14.92	34.92	12.61	21.09	<0.001
Years of schooling								
0-11 Years (1)	242	42.63	162	44.92	80	38.88	5.81	0.32
12 Years (2)	135	24.16	88	20.92	47	29.44		
13-15 Years (3)	119	20.32	80	20.37	39	20.25		
>= 16 Years (4)	77	12.89	53	13.79	24	11.42		
Nativity status								
Immigrant	343	49.81	227	49.65	116	50.07	0.01	0.92
US-born	230	50.19	156	50.35	74	49.93		
Heritage Group								
Puerto Rican (1)	134	13.07	95	13.43	39	12.49	2.90	0.39
Mexican (2)	170	52.62	115	54.73	55	49.18		
Cuban (3)	143	6.01	85	5.14	58	7.43		
All Other Latinx (4)	126	28.30	88	26.70	38	30.90		
Family ties								
Social support[3] (min 2, max 8)	6.19	1.98	6.23	2.00	6.12	2.00	0.20	0.66
Social strain[3] (min 2, max 8)	4.45	1.71	4.49	1.78	4.37	1.58	0.53	0.47
Friend ties								
Social support[3] (min 2, max 8)	5.49	2.15	5.60	2.09	5.31	2.23	2.04	0.16

	All (N=573)		Women (N=383, 62.00%)		Men (N=190, 38.00%)		X or F	P-value
	N[1]/M[2]	%[2]/SE[2]	N[1]/M[2]	%[2]/SE[2]	N[1]/M[2]	%[2]/SE[2]		
Social strain[3] (min 2, max 8)	3.36	1.39	3.38	1.42	3.34	1.34	0.12	0.73
Family quality Categories								
High quality[a]	105	15.98	75	17.38	30	13.70	2.02	0.73
Indifferent[b]	92	14.86	57	13.98	35	16.28		
Ambivalent [c]	202	38.27	131	37.16	71	40.07		
Low quality [d]	174	30.90	120	31.48	54	29.96		
Friend quality Categories								
High quality[a]	95	16.58	66	16.01	29	14.37	3.62	0.34
Indifferent [b]	144	25.13	97	22.45	47	22.66		
Ambivalent [c]	209	36.47	142	39.21	67	34.00		
Low quality [d]	125	24.82	78	22.32	47	28.97		
Presence of Insomnia symptoms								
Yes	482	80.00	326	79.07	157	81.53	0.38	0.54
No	91	20.00	58	20.93	33	18.47		
Psychological Distress								
Mild to Moderate	288	51.38	195	52.41	93	49.69	0.40	0.64
Severe to Very severe	285	48.62	188	47.59	97	50.31		

Notes: [1]N is unweighted; [2]Percentages, means, and standard deviations are weighted, [3]Increasing scores indicate higher social support/social strain; [a] High-quality ties refer to those high in social support and low in social strain; [b] Indifferent ties refer to those with low social support and low social strain; [c] Ambivalent ties refer to those high in social support and high in social strain; [d] Low-quality ties refer to those with low social support and high social strain

Table 2.2

Weighted Poisson Regression Analysis of Family and Friend Social Support and Social Strain and Prevalence of Experiencing Insomnia Symptoms (N=573)

`	Model 1[1] X^2=16.46, p=0.04		Model 2[2] X^2=17.74, p=0.02		Model 3[3] X^2=18.45, p=0.05	
	PR	95% CI	PR	95% CI	PR	95% CI
Family Social Support	1.00	0.97-1.03			1.01	0.98-1.04
Family Social Strain	1.01	0.98-1.04			1.02	0.98-1.05
Friend Social Support			0.98(p=0.08)	0.95-1.00	0.97(p=0.07)	0.95-1.00
Friend Social Strain			1.01	0.97-1.04	1.00	0.96-1.04
Age, y	1.00	0.99-1.00	1.00	0.99-1.00	1.00	0.99-1.00
Women	0.97	0.87-1.08	0.98	0.88-1.09	0.98	0.88-1.09
Men	Ref	Ref	Ref	Ref	Ref	Ref
Immigrant	1.06	0.95-1.19	1.03	0.91-1.16	1.04	0.92-1.17
U.S. Born	Ref	Ref	Ref	Ref	Ref	Ref
Puerto Rican	Ref	Ref	Ref	Ref	Ref	Ref
Mexican	0.89(p=0.02)	0.82-0.98	0.89(p=0.02)	0.81-0.98	0.89(p=0.02)	0.81-0.98
Cuban	0.90	0.79-1.02	0.92	0.81-1.04	0.92	0.81-1.05
All other Latinx	0.77(p=0.001)	0.66-0.89	0.78(p=0.001)	0.67-0.90	0.78(p=0.001)	0.67-0.90

Note: *** p< 0.001, ** p< 0.01, * p<0.05; PR = Prevalence Ratio; 95% CI= 95% Confidence Intervals.
[1]Model 1: Family social ties categories adjusted for age, nativity status, and heritage group; [2]Model 2: Friend social ties categories adjusted for age, nativity status, and heritage group;[3]Model 3: Family and Friend social ties categories adjusted for age, nativity status, and heritage group

Table 2.3

Weighted Poisson Regression Analysis of Synergistic Effects of Family and Friend Social Support and Social Strain and Prevalence of Experiencing Insomnia Symptoms among Latinx Adults (N=573)

	Model 1[1] X^2=16.02, p=0.07		Model 2[2] X^2=22.14, p=0.008		Model 3[3] (Primary model) X^2=22.35, p=0.03		Model 4[4] X^2=22.78, p=0.04	
	PR	95% CI	PR	95% CI	PR	95% CI	PR	95% CI
Family quality								
Indifferent[b]	1.07	0.89-1.29			1.03	0.86-1.24	1.03	0.86-1.24
Ambivalent[c]	1.05	0.89-1.23			1.03	0.86-1.23	1.03	0.86-1.23
Low quality [d]	1.01	0.84-1.21			0.97	0.80-1.18	0.97	0.79-1.18
High-quality[a]	Ref	Ref			Ref	Ref	Ref	Ref
Friend quality								
Indifferent[b]			1.11	0.91-1.36	1.12	0.91-1.36	1.11	0.91-1.35
Ambivalent[c]			0.99	0.82-1.20	0.99	0.81-1.21	0.99	0.82-1.21
Low quality [d]			1.20(p=0.053)	1.00-1.44	1.20^	0.98-1.46	1.20^	0.99-1.46
High-quality[a]	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Age, y	1.00	0.99-1.00	1.00	0.99-1.00	1.00	0.99-1.00	1.00	0.99-1.00
Gender								
Women	0.98	0.87-1.09	0.99	0.88-1.10	0.99	0.89-1.10	0.99	0.89-1.10
Men	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref

Table 2.4(Continued)

	Model 1[1] X²=16.02, p=0.07		Model 2[2] X²=22.14, p=0.008		Model 3[3] (Primary model) X²=22.35, p=0.03		Model 4[4] X²=22.78, p=0.04	
	PR	95% CI	PR	95% CI	PR	95% CI	PR	95% CI
Nativity status								
Immigrant	1.05	0.94-1.19	1.01	0.90-1.14	1.01	0.90-1.14	1.01	0.89-1.14
U.S.-born	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Heritage group								
Puerto Rican	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Mexican	0.90*	0.81-98	0.89**	0.81-0.98	0.89**	0.81-0.98	0.89**	0.81-0.97
Cuban	0.90^	0.79-1.01	0.94	0.82-1.06	0.94	0.82-1.07	0.94	0.83-1.06
All other Latinx	0.77***	0.66-0.89	0.78***	0.67-0.90	0.78***	0.67-0.90	0.78***	0.67-0.90
Psychological Distress								
Mild to Moderate							Ref	Ref
Severe to Very severe							1.07	0.96-1.20

*Note: *** p< 0.001, ** p< 0.01, * p<0.05, ^p<0.1;* [a] High-quality ties refer to those high in social support and low in social strain; [b] Indifferent ties refer to those with low social support and low social strain; [c] Ambivalent ties refer to those high in social support and high in social strain; [d] Low-quality ties refer to those with low social support and high social strain

PR = Prevalence Ratio; 95% CI= 95% Confidence Intervals. [1]Model 1: Family social ties categories adjusted for age, nativity status, and heritage group; [2]Model 2: Friend social ties categories adjusted for age, nativity status, and heritage group; [3]Model 3: Family and Friend social ties categories adjusted for age, nativity status, and heritage group ;[4]Model 4: Family and Friend social ties categories adjusted for age, nativity status, heritage group, and psychological distress

Table 2.5

Weighted Poisson Regression Analysis of Synergistic Effects of Family and Friend Social Support and Social Strain and Prevalence of Experiencing Insomnia Symptoms among Latinx Women (N=383)

	Model 1[1] $X^2=17.41, p=0.03$		Model 2[2] $X^2=19.80, p=0.01$		Model 3[3] $X^2=19.89, p=0.05$		Model 4[4]: $X^2=20.46, p=0.058$	
	PR	95% CI	PR	95% CI	PR	95% CI	PR	95% CI
Family ties categories								
Indifferent[b]	1.05	0.81-1.35			1.01	0.79-1.30	1.00	0.78-1.29
Ambivalent[c]	1.07	0.87-1.32			1.03	0.82-1.30	1.03	0.82-1.30
Low quality [d]	1.04	0.83-1.31			0.99	0.78-1.25	0.98	0.77-1.25
High-quality[a]	Ref	Ref			Ref	Ref	Ref	Ref
Friend ties categories								
Indifferent[b]			1.35*	1.02-1.78	1.35*	1.02-1.79	1.34*	1.02-1.77
Ambivalent[c]			1.23	0.93-1.61	1.22	0.91-1.64	1.22	0.91-1.62
Low quality [d]			1.37*	1.03-1.82	1.37*	1.01-1.85	1.34*	1.00-1.80
High-quality[a]			Ref	Ref	Ref	Ref	Ref	Ref
Age, y	1.00	0.99-1.00	1.00	0.99-1.00	1.00	0.99-1.00	1.00	0.99-1.00
Nativity status								
Immigrant	1.09	0.93-1.28	1.06	0.91-1.24	1.07	0.91-1.25	1.06	0.91-1.25
U.S.-born	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref

Table 2.6 (Continued)

	Model 1[1] X²=17.41, p=0.03		Model 2[2] X²=19.80, p=0.01		Model 3[3] X²=19.89, p=0.05		Model 4[4] X²=20.46, p=0.058	
	PR	95% CI	PR	95% CI	PR	95% CI	PR	95% CI
Heritage group								
Puerto Rican	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Mexican	0.82**	0.73-0.93	0.82***	0.73-0.93	0.82***	0.72-0.92	0.82**	0.72-0.93
Cuban	0.90	0.78-1.03	0.94	0.81-1.08	0.93	0.81-1.07	0.94	0.82-1.08
All Other Latinx	0.77**	0.65-0.91	0.77**	0.66-0.91	0.77**	0.65-0.91	0.77***	0.66-0.90
Psychological Distress								
Mild to Moderate							Ref	Ref
Severe to Very severe							1.09	0.95-1.24

*Note: *** $p < 0.001$, ** $p < 0.01$, * $p<0.05$;* [a] High-quality ties refer to those high in social support and low in social strain; [b] Indifferent ties refer to those with low social support and low social strain; [c] Ambivalent ties refer to those high in social support and high in social strain; [d] Low-quality ties refer to those with low social support and high social strain
PR = Prevalence Ratio; 95% CI= 95% Confidence Intervals.[1]Model 1: Family social ties categories adjusted for age, nativity status, and heritage group; [2]Model 2: Friend social ties categories adjusted for age, nativity status, and heritage group
[3]Model 3: Family and Friend social ties categories adjusted for age, nativity status, and heritage group; [4]Model 4: Family and Friend social ties categories adjusted for age, nativity status, heritage group, and psychological distress

Table 2.7

Weighted Poisson Regression Analysis of Synergistic Effects of Family Social Support and Social Strain and Prevalence of Experiencing Insomnia Symptoms among Latinx Men (N=190)

	Model 1[1] X^2=6.69, p=0.57		Model 2[2] X^2=17.90, p=0.02		Model 3[3] X^2=18.51, p=0.07		Model 4[4]: X^2=18.78, p=0.09	
	PR	95% CI	PR	95% CI	PR	95% CI	PR	95% CI
Family ties categories								
Indifferent	1.12	0.88-1.44			1.12	0.85-1.47	1.12	0.85-1.48
Ambivalent[b]	1.06	0.82-1.38			1.06	0.80-1.41	1.06	0.80-1.41
Low quality	0.99	0.74-1.31			0.97	0.71-1/31	0.96	0.71-1.31
High-quality[d]	Ref	Ref			Ref	Ref	Ref	Ref
Friend ties categories								
Indifferent			0.85	0.67-1.07	0.83	0.65-1.08	0.83	0.65-1.07
Ambivalent[b]			0.75**	0.61-0.93	0.74**	0.59-0.93	0.74**	0.59-0.93
Low quality			1.01	0.87-1.16	0.99	0.83-1.18	0.99	0.83-1.19
High-quality[d]			Ref	Ref	Ref	Ref	Ref	Ref
Age, y	1.00	0.99-1.01	1.00	0.99-1.01	1.00	0.99-1.01	1.00	0.99-1.01
Nativity status								
Immigrant	0.95	0.84-1.19	1.01	0.85-1.21	1.00	0.84-1.20	1.01	0.84-1.20
U.S.-born	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref

Table 2.1 (Continued)

Heritage group								
Puerto Rican	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Mexican	1.05	0.90-1.22	1.02	0.87-1.17	1.03	0.89-1.19	1.03	0.89-1.19
Cuban	0.95	0.75-1.20	0.96	0.76-1.22	0.98	0.77-1.25	0.98	0.77-1.25
All Other Latinx	0.79	0.60-1.05	0.81	0.62-1.06	0.82	0.63-1.07	0.82	0.63-1.07
Psychological Distress								
Mild to Moderate							Ref	Ref
Severe to Very severe							1.03	0.86-1.23

*Note: *** p< 0.001, ** p< 0.01, * p<0.05;* [a] High-quality ties refer to those high in social support and low in social strain; [b] Indifferent ties refer to those with low social support and low social strain; [c] Ambivalent ties refer to those high in social support and high in social strain; [d] Low-quality ties refer to those with low social support and high social strain

PR = Prevalence Ratio; 95% CI= 95% Confidence Intervals. [1]Model 1: Family social ties categories adjusted for age, nativity status, and heritage group; [2]Model 2: Friend social ties categories adjusted for age, nativity status, and heritage group [3]Model 3: Family and Friend social ties categories adjusted for age, nativity status, and heritage group; [4]Model 4: Family and Friend social ties categories adjusted for age, nativity status, heritage group, and psychological distress

Paper 3

Examining the indirect effects of acculturation stress on insomnia through rumination and alcohol use among Latinx women and men

Introduction

Increased acute and chronic perceived stress has been associated with an increased risk of experiencing insomnia symptoms[227] and developing clinical insomnia in prospective and cross-sectional studies among majority non-Latinx, White adult samples.[56,228] Stress is hypothesized to affect insomnia through promoting hyperarousal and alertness and, thus, inhibiting sleep.[74,229,230] Among Latinx adults, the largest ethnic minority group in the United States (US),[231] acculturation stress, a type of sociocultural stress associated with the multidimensional challenges of adapting to or adopting a culture different than one's heritage culture,[53,232] has been independently associated with increased insomnia symptoms in population-based community studies.[48,233] These studies found that increased acculturation stress was consistently associated with increased insomnia symptom severity among Latinx adults even when accounting for other stress types including ethnic discrimination and chronic stress.[48,233] The independent association of acculturation stress and insomnia symptoms suggests that Latinx adults experience additional types of stress than non-Latinx White adults, placing Latinxs at an increased risk of experiencing insomnia symptoms.[48,233] Among the general non-Latinx White population, studies have expanded on the stress-insomnia association to examine mechanisms, such as coping strategies, that drive this relationship,[56,227,228] however, the mechanisms linking acculturation stress and insomnia remain underexplored.

Theoretical Framework: Stress, Coping Strategies, and Insomnia

Examining the acculturation stress-insomnia association using an integrated stress, coping, and disease model such as the Transdisciplinary Model of Stress [67] may elucidate the mechanisms linking acculturation stress and insomnia among Latinx adults. The Transdisciplinary Model of Stress[67] combines the transactional theory of stress and coping,[234] which states that when individuals experience acute stress, they engage in coping strategies to attempt to manage or eliminate distress, and the stage model of stress and disease,[235] which describes the link between stress and the onset of disease, to explain the relationship between acute stress and the development of mental and physical diseases. In the Transdisciplinary Model of Stress,[67] when an individual experiences acute stress, they engage in coping strategies that affect psychological and physical responses to stress, which in turn acutely affect health outcomes, such as insomnia symptoms. This model expands on both the transactional theory of stress and coping and the stage model of stress and disease by incorporating contextual factors, such as gender, that may shape how individuals cope with stress and, thus, how stress affects health.[67] When applied to the acculturation stress-insomnia relationship, the Transdisciplinary Model of Stress delineates how the experience of acculturation stress may produce psychological and physiologic arousal that, in turn, may prompt an individual to use coping strategies to attempt to regulate this arousal. If a maladaptive coping strategy is used, an individual may experience insomnia symptoms due to a prolonged or exacerbated stress response.[56] According to this model, contextual factors, such as gender, and the type of stress being experienced influence the type of coping strategies selected.[67] In this paper, the Transdisciplinary Model of Stress serves as a guiding framework to examine how acculturation stress may lead to experiencing insomnia symptoms by eliciting specific coping strategies, while considering how gender shapes this process among Latinx adults.

Coping Strategies and Insomnia

Previous research demonstrates that emotion-focused forms of coping, defined as cognitive or behavioral efforts aimed at regulating emotional reactions to acute stress that do not directly alter the stressful situation, have been positively associated with insomnia symptoms in majority non-Latinx White adult samples.[55,58,60,61,154,227,228,236] These forms of coping are used most often in response to stressful situations perceived to be impossible to modify or resolve,[237] and include a wide range of coping strategies such as selective attention, avoidance, among others.[234] Although the effectiveness of different emotion-focused coping strategies depends on the context in which they are used,[57] a subset of these coping strategies are generally considered maladaptive, because instead of regulating stress or resolving the stressful situation, they tend to prolong or exacerbate distress.[234,238,239] These maladaptive emotion-focused strategies are selective attention coping strategies, characterized by narrowing one's attention towards certain thoughts, feelings, or behaviors [234,238–240] and avoidance coping strategies, defined as emotion-focused strategies used to manage distress through escaping or avoiding a stressful situation.[234] Specifically, rumination, a selective attention coping strategy subtype and substance use such as alcohol use, an avoidance coping strategy subtype, have been associated with increased insomnia symptoms.[58,60–62,154,236,241] Accordingly, these subtypes of emotion-focused coping strategies may serve as mechanisms linking acculturation stress and insomnia among Latinx adults because acculturation stress is often perceived as an uncontrollable and unmodifiable type of stress.[242,243]

Selective Attention Coping Strategies: Rumination. Rumination, a selective attention coping strategy subtype [240] characterized by perseverative thinking on past stressful occurrences,[1,2] cognitive inflexibility, and difficulty diverting attention from negative thoughts,[244,245,] has been consistently associated with increased insomnia symptoms.[58,60,154] In the context of insomnia, rumination is thought to provoke insomnia symptoms because, under conditions of stress, this

selective attention coping strategy prolongs the physiologic stress response and promotes arousal,[64,65,227,246] by focusing one's attention on feelings of stress or a stressful event.[239,240] In fact, two models describing the pathogenesis of insomnia, the cognitive model of insomnia and the stress-diathesis model of insomnia, state that rumination and other types of negative cognitions in response to stress during the day and at bedtime promote arousal and lead to insomnia symptoms.[55,56] Consistent gender differences in the association between rumination and insomnia symptoms have been found. The relationship between this selective attention coping strategy and insomnia appears to be stronger among women than men. [58,64,65,246–248] This gender difference may exist because women tend to use rumination as a coping strategy more often than men.[249] Several theories suggest gender socialization as well as gender role beliefs in women's subordinate status, may lead to more rumination among women than men. [250,251] These theories state that social messaging encourages women to focus and discuss their negative emotions, which may lead to rumination, while men are encouraged to suppress and act upon their emotions.[250,251] Additionally, Nolen-Hoeksema and colleagues[250,252] suggest that women's subordinate social status, based on gender roles and sexism, place women at increased risk of experiencing uncontrollable stress which often elicits maladaptive, emotion-focused coping strategies. [237] To date, the relationship between rumination and insomnia and the potential gender differences in this relationship have not been explored among Latinx adults.

Although very few studies have examined the relationship between acculturation stress and rumination, acculturation stress has been associated with increased rumination characteristics such as negative automatic thoughts characterized by feelings of helplessness,[253] and difficulty regulating emotions, characterized by difficulty accepting and controlling emotional responses, difficulty performing goal-directed behavior, and limited emotional coping resources.[254] Given the

limited but consistent association between acculturation stress and rumination in Latinx samples and results supporting the relationship between rumination and insomnia symptoms in mostly non-Latinx White samples, there is sufficient evidence to suggest that rumination may be an important emotion-focused coping strategy linking acculturation stress and insomnia symptoms among Latinx adults.

Avoidance Coping Strategies: Alcohol Use. The use of substances such as alcohol, cannabis, tobacco, and opioids has been associated with poor sleep quality and insomnia symptoms.[61,62,241,255,256] Of these substances, alcohol use has been the most studied and most consistently associated with worsening insomnia symptoms.[62,241,257] Although people with insomnia tend to use alcohol as a form of self-medication to reduce stress and induce sleep,[236] abundant evidence demonstrates that alcohol use prolongs the sleep onset period and leads to sleep disruption as it is metabolized.[61,236,258,259] Depending on the amount of alcohol consumed, alcohol can have stimulating or sedating effects on an individual.[61] On one hand the stimulating effects, usually observed at low doses of alcohol, can increase difficulty in initiating sleep.[61] On the other hand, the sedative effects of alcohol, observed at moderate to high doses, may facilitate falling asleep but disturb sleep during the night once the alcohol is metabolized, creating a rebound effect.[61] Gender differences in the effects of alcohol use on insomnia have been documented although findings have been inconsistent. While some studies demonstrate that alcohol use among women may serve as a protective factor against insomnia symptoms,[66] others found no gender differences in the positive association between alcohol use and insomnia symptoms,[63] and yet others showed more insomnia symptoms among women who used alcohol than among men.[63] Although there is a large body of evidence demonstrating the association between alcohol use and insomnia symptoms, studies examining this relationship in Latinx samples are very limited.

While Latinxs have been underrepresented in alcohol use and insomnia research, several studies in Latinx samples have found that acculturation stress is positively associated with alcohol use.[75–77,242] For example, in a population-based community study of Latinx adults, those who reported higher levels of acculturation stress also reported higher quantities of alcohol consumption and more frequent alcohol use than those who reported lower levels of acculturation stress.[76] This study, along with others, also suggest this association may be stronger among Latino men than Latina women.[76,260] These gender differences may be due to Latino men's increased use of alcohol as a coping strategy in the absence of alternate, more effective coping strategies, such as social support, when compared to Latina women.[76,260,261] Because alcohol use has been consistently, positively associated, with insomnia and acculturation stress, this avoidance coping strategy may serve as a mechanism linking acculturation stress and insomnia symptoms among Latinx adults.

Present study

Presently, the majority of studies examining the relationship between stress, emotion-focused coping strategies, specifically rumination and alcohol use, and insomnia have been conducted among majority non-Latinx White adults. Additionally, although there is some evidence of gender differences in the use of rumination and alcohol use, gender differences in how acculturation stress and these coping strategies affect insomnia among Latinx adults have not been examined. This study aims to address these scientific gaps by 1) examining the indirect effects of acculturation stress on insomnia symptoms through rumination, an emotion-focused coping strategy characterized by selective attention, 2) testing the indirect effects of acculturation stress on insomnia symptoms via its effects on alcohol use, an emotion-focused coping strategy characterized by avoidance, 3) and, as an exploratory aim, investigating the gender differences in

these indirect effects. I hypothesize that increased acculturation stress will be indirectly associated with increased insomnia symptoms via increasing rumination and alcohol use. Further, I hypothesize that among women, the indirect effects of acculturation stress and insomnia through rumination will be stronger than among men, while these effects via alcohol use will be weaker than among men. Identifying the emotion-focused coping strategies linking acculturation stress and insomnia among Latinx women and men may help inform culturally relevant psychosocial targets of intervention to treat insomnia in this population.

Methods

Data

Baseline data from a sample of 201 Latinx adults in the New York City area participating in the LAtino Sleep and Health Study (LASH) was used to test the indirect effects of acculturation stress on insomnia symptoms through rumination and alcohol use. LASH is a community study of generally healthy Latinx adults which examines the relationship among sleep, stress, and self-regulation. Participants in this study completed a screening survey, an in-person baseline survey, a polysomnography test conducted at a New York City hospital, and a forty-day ecological momentary assessment of psychosocial factors and objective and subjective sleep outcomes. The eligibility criteria for participating in the baseline survey of LASH included being at least 18 years old, self-identifying as Latinx or Hispanic, and having access to a cellphone or computer with an internet connection. If participants reported they were pregnant, currently enrolled in a two or four-year undergraduate program, using prescription or over-the-counter sleep aids, using medications with somnolent side effects, or working a night shift, they were not eligible to participate in the survey. These exclusion criteria were specified because individuals with these characteristics tend to have significantly different sleep patterns than the general population, particularly pregnant

women and college students.[262–264] Additional exclusion criteria included, reporting physician diagnosed bipolar disorder, psychosis, or sleep apnea with a prescription for a continuous positive airway pressure machine, a body mass index greater than $30kg^2$, having a Charlson Comorbidity Score[265] above two, and having a CAGE Substance Abuse[266] score equal to or greater than two. These inclusion and exclusion criteria were set to limit the presence of psychological and physical conditions, such as obstructive sleep apnea, that negatively impact usual sleep patterns.

After providing informed consent, participants completed the baseline survey in either English or Spanish over 60-90 minutes at a local community health center using Qualtrics. Upon participant request, a bilingual research assistant helped participants navigate the online survey and read the survey items to them. Participants answered questions about their socio-demographic characteristics, their mental and physical health, sleep health, stress levels, coping strategies, among other inquires. The Columbia University Institutional Review Board approved the LASH study (AAAQ1661) and this sub study (AAAT9413).

Measures

Acculturation Stress. The Hispanic Stress Inventory(HSI)[267] was used to measure acculturation stress. This inventory captures stressful situations potentially experienced by the Latinx community in the US. Using 17 items, individuals were asked to respond "Yes/No" to experiencing a stressful situation in the past three months and, if they responded affirmatively, to rate how worried or concerned they were about the stressful situation. An example of a stressful situation is "Because I do not speak English, it has been difficult for me to interact with others". If participants responded "Yes" to this statement, they were asked "How worried or tense are you about it?" They responded using the following items: Not at all worried/tense, A little worried/tense, Moderately worried/tense, Very worried/tense, Extremely worried/tense. If

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participants selected "No" the item was scored as 0. If participants selected "Yes," the worried/tense response items were scored from 0-4 with higher scores indicating more worry/tension. The total scores were calculated by summing the individual items. In this sample, the scale had good psychometric properties (Cronbach's alpha=0.73).[267,268] The HSI has been validated in Spanish.[268]

Rumination. To measure the frequency with which participants engage in rumination the brooding subscale of the Ruminative Response Scale (RRS)[269] was used. The RRS has been validated in English and Spanish.[269,270] Participants were asked to indicate the frequency with which they think or do ten different ruminative behaviors when they feel depressed. Of these ten items, five inquired about brooding, a type of rumination characterized by perseverative thoughts often associated with sullenness. [269] The brooding items included questions such as "Think 'Why do I have problems other people don't have?'" and "Think 'Why can't I handle things better?" The item response choices were: Almost never, Sometimes, Often, Almost always. The brooding subscale was selected as the mediating variable to answer this research question because it has been strongly associated with depression and anxiety,[269,271–273] two often co-occurring conditions with insomnia,[274]and poor sleep outcomes, such as short sleep duration and poor sleep quality.[219,275] In this sample, the brooding subscale had a Cronbach's alpha of 0.78.

Alcohol use. The Quantity-Frequency Index,[276,277] which captures typical drinking patterns over a specified period of time was used to measure alcohol use. Participants provided the number of wine, beer, and liquor servings they consume over a typical week. The number of beverages across the three alcoholic beverage types were summed to create an aggregate count of the number of alcoholic beverages consumed per week. Additionally, the number of days in which participants engaged in binge drinking, defined as consuming more than five alcoholic beverages at the same

time or within a couple of hours of each other, [278,279] in the past four weeks was evaluated using a single item from this index. The Quantity-Frequency Index has been validated in national survey studies and has been tested among English and Spanish-speaking Latinx adults.[75,281]

Insomnia symptoms. The Insomnia Severity Index (ISI) is a self-reported measurement of different symptoms of insomnia in the past two weeks,[70] and was used as the primary dependent variable. This 7-item scale assessed key insomnia symptoms including the severity of difficulty initiating or maintaining sleep, waking up too early, daytime impairments due to sleep problems, and distress about sleep problems.[70] Individual items were scored from 1-5 with increasing scores representing an increase in insomnia symptom severity.[70] The items were then summed to calculate the overall ISI.[70] ISI has a specificity index of 98.3% to detect insomnia when using a cutoff score of ≥ 15 to indicate moderate to severe insomnia.[70] This index has strong psychometric properties[70,146] and has been validated among Spanish-speakers.[282] In this sample the ISI demonstrated strong reliability (Cronbach's alpha=0.79).

Covariates. Self-reported age and socioeconomic status were included in descriptive analyses and as covariates. Previous studies in Latinx population-based community samples have demonstrated that older adults have worse sleep outcomes than younger adults,[206] therefore, accounting for the variance introduced by participants' ages was important to isolate the effects of acculturation stress, rumination, and alcohol use on insomnia symptoms. Additionally, low socioeconomic status has been associated with poor sleep outcomes in a community-based sample of Latinx adults.[206] Socioeconomic status may influence the coping strategies individuals use when experiencing acculturation stress. Studies have demonstrated that those of lower socioeconomic status may have increased difficulty coping with stress, because they are at an increased risk of experiencing frequent stress from multiple sources such as job strain, food insecurity, housing

among other sources of stress, simultaneously than those of higher socioeconomic status.[283] The frequency and amount of stress may lower one's overall capacity to use coping strategies to regulate distress.[283,284] In this study, socioeconomic status was calculated using annual household income and number of dependents on the annual household income. Low socioeconomic status was assigned to those with an annual income at or below the NYCgov poverty threshold[285] taking into account the number of dependents on the annual income. Lastly, fully adjusted models accounted for general perceived stress. Given the well-documented, positive association between stress and insomnia symptoms,[227,228] including general perceived stress, measured through the 4-item Perceived Stress Scale,[286] may have helped isolate the indirect effect of acculturation stress on insomnia symptoms through rumination and alcohol use.

Analytical Strategy

A complete case analysis was conducted with a total sample of N=187. Participants that were not included in the complete case analysis (n=13) had missing age, gender, or annual household income level information. Regression diagnostic analyses were conducted to review the distributions of acculturation stress, brooding, alcohol use (i.e., alcoholic drinks in a typical week; days of binge drinking), and insomnia symptoms scores to detect outliers. Insomnia symptom scores were transformed (i.e., square root) to ensure that subsequent analyses were appropriately conducted on the normal distribution of this dependent variable. Descriptive analyses were conducted to document the sample's sociodemographic characteristics, acculturation stress scores, brooding scores, alcohol use, insomnia symptoms, and general perceived stress scores. Gender differences in the distribution of the independent variable, dependent variable, mediators, and covariates were examined using bivariate analyses.

First, the indirect effect of acculturation stress on insomnia symptoms via brooding were tested using a regression-based mediation analysis utilizing the PROCESS macro for RStudio.[287–289] Specifically, bias-corrected bootstrap tests of mediation[287] with case resampling (1000 replications) were conducted (Figure 3.1).[287] Standard errors of the indirect effect were bootstrapped with case resampling (1000 replications) and were used to determine the bias-corrected, bootstrapped confidence interval limits to test for statistical significance in the mediation.[288] The primary mediation models were unadjusted. Progressive adjustments were made to account for age, socioeconomic status, determined using self-reported annual income level and number of dependents on annual income following the NYCgov poverty threshold[285] and general perceived stress. In separate mediation models, the same procedures were implemented to test the indirect relationship between acculturation stress and insomnia symptoms via alcohol use, measured through the number of alcoholic beverages consumed in a typical week. As a secondary analysis, the indirect effect of acculturation stress on insomnia symptoms through number of days binge drinking was examined. Including this secondary model allowed for an exploration of the mediating effects of high alcohol consumption on the relationship between acculturation stress and insomnia. Progressive adjustments for age, socioeconomic status, and general perceived stress were also included in these mediation models. To test the exploratory aim of this paper, gender-stratified analyses using the PROCESS macro[290] were conducted to explore the gender differences in the mediation models. Progressive adjustments for age, socioeconomic status, and general perceived stress were conducted.

[Insert Figure 3.1]

Lastly, sensitivity analyses examining alternate mediation models with insomnia symptoms as the independent variable and acculturation stress as the dependent variable were

conducted. Although there is consistent evidence supporting stress as a predictor of poor sleep outcomes, specifically insomnia, other studies also suggest poor sleep predicts increased stress.[291,292] Because claims to the temporal relationship among these variables cannot be determined using these cross-sectional data, these sensitivity analyses explored the associations of the variables of interest in different configurations.

Power Analysis

Bias-corrected mediation tests can provide adequate power for analyses in small samples even when small effect sizes are predicted.[293] I have consulted with the Fritz & MacKinnon (2007)[293] guidelines on required sample size to detect a mediation effect to assess for adequate power with a sample size of 187 for a mediation analysis. Based on previously published data, the size of the α path (stress to perseverative cognition)= -.37[294] and the β path (perseverative cognition to insomnia) =-.24[295] which reflects medium effect size condition ("HH") suggest a required sample size of 148 in order to achieve a .8 power for the bias-corrected bootstrap. Similarly, previous published analyses demonstrate that the size of the α path (stress to substance use)= .33[228] and the β path ranging from (substance use to insomnia) .09 [228] to 0.23[296] which reflects small to medium effect size conditions ("HS" and "HH") requires a sample size ranging between 148 and 368 to achieve a .8 power for a bias-corrected bootstrap. As such, with N=187, I will have adequate power to detect an indirect effect using bias-corrected bootstrap tests of mediation. Because gender-stratified analyses to explore these mediation models have not been conducted, the same estimates were used to estimate the statistical power necessary to detect the effects of brooding and alcohol use among subsamples of Latinx women and men. With a sample size of n=120 for Latina women and n=67 for Latino men, this study is statistically underpowered

to test the indirect effects of acculturation stress on insomnia symptoms through brooding and alcohol use.

Results

The analytical sample of 187 participants included 120 women (64.17%) and 67 men (35.83%) (Table 3.1). A variety of Latinx heritages were represented in the sample, with most participants originating from South America (31.02%) and the Dominican Republic (30.48%). Most participants were immigrants (58.82%), lived above the NYC poverty threshold (69.52%), and had a college degree or more (68.45%). The average age of participants was 37.43 years of age (SD=13.67). On average, participants reported a mean acculturation score of 9.28 (SD=9.51), perceived stress score of 4.96 (SD=3.11), brooding score of 9.44 (SD=2.88), and a mean of 6.65 (SD=5.51) on the Insomnia Severity Index. The majority of participants did not have clinically significant insomnia or had subthreshold clinical insomnia (61.50%), while 11.76% could be classified as having moderate to severe clinical insomnia. In a typical week, participants consumed an average of 2.61 alcoholic beverages (SD=4.68). Participants reported engaging in binge drinking <1 day (SD=1.47) in the past four weeks, on average. Most participants categorized themselves as 'Light drinker' (44.39%), followed by 'Non-drinker' (29.95%).

There were no statistically significant differences in the distribution of age, educational attainment, nativity status, heritage group, acculturation stress scores, brooding scores, general perceived stress scores, or insomnia symptoms between the women and men in this sample. Men reported consuming 2.11 more alcoholic beverages in a typical week (Men: M=3.97, SD=6.45; Women: M=1.86, SD=2.70, p<0.01). On average, men also reported engaging in binge drinking more frequently than women (Men: M=1.01 days, SD=2.02; Women: M=0.46 days, SD=0.99,

p<0.01). Self-reported drinking status as a non-drinker, light drinker, moderate drinker, or heavy drinker did not differ significantly across genders.

[Insert Table 3.1]

Primary Mediation Models

Brooding. The primary model demonstrated the indirect effects of acculturation stress on insomnia symptoms through brooding. The total and direct effects of acculturation stress on insomnia symptoms were statistically significant, b=0.04, 95% CI [0.02-0.06]; b=0.02, 95% CI [0.004-0.04], respectively. The indirect effects of acculturation stress on insomnia symptoms through brooding were also statistically significant b=0.02, 95% BCa CI [0.01-0.03] (Figure 3.2). These effects were sustained when adjusting for age, being at or below the NYC poverty threshold, and general perceived stress, b=0.02, 95% BCa CI [0.01-0.03].

[Insert Figure 3.2]

Alcohol Use. Although the total and direct effects of acculturation stress on insomnia symptoms were statistically significant, b=0.04, 95% CI [0.02-0.04]; b=0.04, 95% CI [0.03-0.06], the indirect effect of acculturation stress on insomnia symptoms via total alcoholic beverages drank in a typical week were not statistically significant, b=-0.001, 95% BCa [-0.004-0.002] (Figure 3.3). Similar effects were shown in models examining this indirect relationship via days of binge drinking, b= -0.003, 95% CI BCa [-0.003-0.002] (Figure 3.4).

[Insert Figure 3.3]

[Insert Figure 3.4]

Exploratory Gender-Stratified Mediation Models

Brooding. Gender stratified analyses were conducted to test the exploratory aim examining the differences between women and men in the indirect effects of acculturation stress on insomnia symptoms through brooding and alcohol use. In the unadjusted model tested among women,

acculturation stress continued to have a statistically significant total effect on insomnia symptoms, b=0.04, 95% CI [0.02-0.06] (Table 3.2). However, the direct effects were not statistically significant, b=0.02, 95% CI [-0.01-0.04]. The indirect effect of acculturation stress on insomnia symptoms via brooding was similar to the indirect effect in the aggregate model, b=0.02, 95% BCa CI [0.01-0.04]. When adjusting for age, being at or below the NYC poverty threshold, and perceived psychological stress, the coefficient of the indirect effect increased slightly and remained statistically significant, b=0.03, 95% CI BCa [0.01-0.05]. Among men, the total and direct effects of acculturation stress on insomnia symptoms remained consistent with models in the aggregate and women-only sample, b=0.04, 95% CI [0.01-0.06]; b=0.03, 95% CI [0.002-0.05] (Table 3.2). The indirect effect was also statistically significant, although the coefficient was smaller than among women, b=0.01, 95% CI BCa [0.004-0.04]. In models adjusting for age, being at or below the NYC poverty threshold, and perceived psychological stress, the indirect effect of acculturation stress on insomnia symptoms through brooding was no longer statistically significant among men, b=0.01, 95% BCa CI [-0.002-0.03].

[Insert Table 3.2]

Alcohol Use. The total and direct effects of acculturation stress on insomnia symptoms were statistically significant in the alcohol use models among women and men (Table 3.3; Table 3.4). As seen in the aggregate model, the indirect effect of acculturation stress on insomnia symptoms via alcohol use, measured through number of alcoholic beverages drank in a typical week, was not a statistically significant among women or men, b=0.001, 95% CI BCa [-0.004-0.01; b=-0.002, 95% CI BCa [-0.01-0.002]. Similarly binge drinking was not a statistically significant mediator in this relationship for either gender, b=0.001, 95% CI BCa [-0.004-0.01]; b= -0.002, 95% CI BCa [-0.01- 0.001].

Sensitivity Analyses

Brooding. Given the cross-sectional design of this study, alternate mediation models were explored using insomnia symptoms as the independent variable and acculturation stress as the dependent variable. These models also showed a statistically significant indirect effect of insomnia symptoms on acculturation stress through brooding (Table 3.5). The total and direct effects in unadjusted models had slightly larger coefficients with insomnia symptoms as the independent variable, b=0.09, 95%CI [0.05-0.13]; b=0.04, 95% CI [0.004-0.08]. The estimate for the indirect effect was also larger than the primary model in the main analysis, b=0.05, 95% CI BCa [0.03-0.07]. These patterns continued when testing these relationships in the women-only sample, total effect: b= 0.07, 95% CI [0.02-0.11]; direct effect: b=0.02, 95% CI [-0.02-0.07]; and indirect effect: b=0.04, 95% CI BCa [0.01-0.08]. The direct effect of insomnia symptoms on acculturation stress, accounting for brooding, remained statistically nonsignificant among women in these sensitivity analyses. In the all-men sample, the estimates of the total, direct, and indirect effects were notably larger with insomnia symptoms as the independent variable when compared to the aggregate or all-women samples, b=0.16, 95% CI [0.09=0.23], b=0.10, 95% CI [0.02-0.18], b=0.06, 95% CI BCa [0.03-0.11].

[Insert Table 3.5]

Alcohol Use. When replacing acculturation stress, the independent variable, with insomnia symptoms, the total and direct effects of insomnia symptoms on acculturation stress continued to be statistically significant in models testing alcoholic beverages consumed in a typical week and days binge drinking as mediators, b=0.09, 95% CI [0.05-0.13]; b=0.10, 95% CI:0.06-0.13 (Table

3.6); b=0.09, 95% CI [0.05-0.13]; b=0.09, 95% CI:0.06-0.13 (Table 3.7). As seen in the brooding mediation models, these effects were larger than in models were acculturation stress was the independent variable. The indirect effects of insomnia symptoms on acculturation via alcoholic beverages consumed in a typical week and number of days binge drinking for the aggregate sample and subsamples of women and men were not statistically significant (p> 0.05) (Table 3.6; Table 3.7).

[Insert Table 3.6]

[Insert Table 3.7]

Discussion

The aims of this paper were to examine the indirect effects of acculturation stress on insomnia symptoms through two emotion-focused coping strategies (i.e., rumination and alcohol use) among Latinx adults. In accordance with the hypothesis, the primary model demonstrated a statistically significant indirect association between acculturation stress and insomnia symptoms via brooding, a specific type of rumination positively associated with depression and anxiety.[269,271–273] However, contrary to what was hypothesized, alcohol use, operationalized as the number of alcoholic beverages consumed in a typical week and number of days binge drinking, was not a statistically significant mediator in this relationship. The statistical significance of the indirect effect of acculturation stress on insomnia symptoms via both coping strategies remained the same when adjusting for age, socioeconomic status, and psychological perceived stress. The exploratory analyses examining potential gender differences in these mediation models indicated that the indirect effect of acculturation stress on insomnia symptoms through brooding may be larger among Latina women than among Latino men. As seen in the aggregate model, the indirect effect of acculturation stress on insomnia symptoms via alcohol use was not statistically significant

among Latina women and Latino men. Although future longitudinal studies are needed to replicate these mediation models, these findings suggest that developing and implementing psychological interventions to reduce the use of rumination, specifically brooding, as a coping strategy may be important to improve insomnia symptoms among Latinx adults experiencing acculturation stress.

Indirect Effects Via Brooding

To my knowledge, this is the first study examining the indirect effect of acculturation stress on insomnia symptoms via brooding, a type of rumination, in this population. The statistically significant indirect relationship between acculturation stress and insomnia symptoms through brooding is consistent with findings from studies examining the mediating role of rumination in the relationship between other types of social stress, such as ethnic/racial discrimination, and poor psychological outcomes.[297–299] These studies describe significant, positive, and indirect association between ethnic/racial discrimination and depressive symptoms and psychological distress through rumination among racially and ethnically diverse samples including majority Latinx, Asian, and/or African American/Black participants.[297–299] Ethnic/racial discrimination is one domain of acculturation stress[53,232] and although these sources of stress are distinctly associated with mental health outcomes among Latinx adults,[48,233] they are both forms of uncontrollable stress that often illicit the same maladaptive coping strategies which, in turn, are associated with poor mental health outcomes.[242,243,300,301] When Latinx adults engage in rumination, particularly brooding, they may prolong or exacerbate the distress associated with acculturation stress, which may promote cognitive and physiologic arousal making it difficult to obtain good quality sleep.[65,218,246,302] It is important to note that engaging in ruminative thinking is not always associated with increased distress. When defined as self-focused reflection, rumination may facilitate problem solving and serve as a way to regulate distress.[303–305] However, in the context of sleep, engaging in activities

that promote wakefulness in bed on a regular basis, such as rumination, may erode the learned association of the bed and bedroom as a place to rest and sleep and lead to experiencing insomnia symptoms, as described in the principles of stimulus control.[123] Although these findings are consistent with previous studies among general populations as well as racial/ethnic minority populations, further studies using longitudinal data are needed to confirm these results. If these results are confirmed, efforts to reduce the use of rumination, specifically brooding, as a coping strategy among Latinx adults may be an important target of intervention to improve insomnia symptoms in this population. Future studies investigating the association between other forms of rumination, such as reflective rumination which is associated with thoughts of neutral valence,[239] and insomnia symptoms may elucidate the mechanisms through which rumination influences insomnia symptoms. Additionally, although the slightly larger indirect effect of acculturation stress on insomnia symptoms via brooding among women than men supports previous studies suggesting rumination is more strongly associated with insomnia among women than men in the general population,[58,64,65,246–248] studies formally testing the gender differences in these mediation models in sufficiently powered samples are needed to corroborate these findings.

Indirect Effects via Alcohol Use

In this study, it was hypothesized that alcohol use would serve as a statistically significant mediator in the relationship between acculturation stress and insomnia symptoms among a sample of Latinx adults. Contrary to the hypothesis, alcohol use did not have a statistically significant indirect effect on this relationship. In the mediation model, acculturation stress was not statistically significantly associated with alcohol use. These findings reflect the results from a small number of studies demonstrating that acculturation stress and alcohol use were not significantly associated among Latinx samples.[306] Additionally, similar results were found in a study examining the

mediating effects of alcohol use on the relationship between ethnic discrimination and depressive symptoms among Latinx adults.[307] In their study, Torres and Vallejo[307] found that experiencing a negative reaction to being treated unfairly based on ethnic discrimination, such as experiencing anger or getting into an argument over the situation, were statistically significantly associated with increased alcohol use, however, alcohol use did not predict depressive symptoms and did not serve as a significant mediator in this relationship. A commonality between the current study and Torres and Vallejo's study[307] is that the majority of participants did not report problematic or risky levels of alcohol consumption. Contrastingly, studies demonstrating a significant association between acculturation stress and alcohol use have included Latinx samples with elevated alcohol use and alcohol use disorder.[76,242,261] Future studies replicating this mediation model in a sample of Latinx adults with higher levels of alcohol consumption or alcohol use disorder may better elucidate the relationship among acculturation stress, alcohol use, and insomnia symptoms in this population.

Limitations

This study has some limitations due to sample selection and study design. Firstly, only generally healthy Latinx adults who met the inclusion and exclusion criteria completed the LASH baseline survey limiting the generalizability of these findings to Latinxs with similar characteristics. Secondly, because Latinxs who had elevated scores on the CAGE Substance Abuse scale, indicating alcohol and other substance misuse or abuse, [266] were excluded from participating in LASH, variability in alcohol consumption was limited in the sample. This sample selection may have limited the ability to detect the associations among acculturation stress, alcohol use, and insomnia symptoms present among individuals who misuse or abuse alcohol. Additionally, the gender-stratified analyses were statistically underpowered to test the mediation models due to small sample size. As stated previously, these analyses were exploratory in this paper. Studies

should replicate these models in sample sufficiently powered to detect the indirect effects of acculturation stress on insomnia symptoms through brooding and alcohol use. Lastly, the cross-sectional design of LASH prohibits the ability to comment on the causal relationship among acculturation stress, coping strategies, and insomnia symptoms. Although sensitivity analyses were conducted to examine the relationship of these variables in alternate arrangements, clear conclusions on the directionality of the mediation models cannot be drawn from this study. Future studies should leverage ecological momentary assessments to capture the coping strategies Latinx adults engage with when confronted with various types of stress throughout the day and at bedtime to measure the causal relationship more accurately among acculturation stress, brooding, alcohol use, and insomnia symptoms.

Practice Implications

This study has important implications for clinical practice across behavioral health professions. Firstly, as demonstrated in previous studies,[48,233] health professionals should evaluate the presence of sociocultural stress, such as acculturation stress, to identify Latinx adults at increased risk of experiencing insomnia symptoms and facilitate their referral to treatment. Given that social workers are trained in person-in-context perspectives and models of culturally competent care, they are particularly well positioned to lead the incorporation of sociocultural stress in evaluation processes. Social workers could be trained to apply these perspectives and models to assess whether clients are experiencing acculturation stress and determine if that stress is contributing to other health issues, such as insomnia. Additionally, if brooding continues to serve as a mediator in the relationship between acculturation stress and insomnia symptoms in longitudinal studies, psychological interventions that aim to reduce brooding and improve sleep, such as mindfulness-based stress reduction[308] and cognitive behavioral therapy for insomnia,[309],

could be culturally adapted to explicitly address acculturation stress when working with Latinx adults.

Conclusion

Although several studies have identified sociocultural stress as a precipitating factor for insomnia among Latinx adults, the mechanisms driving this association are poorly understood. This study is among the first to examine the indirect effects of two emotion-focused coping strategies on the relationship between acculturation stress and insomnia symptoms among Latinx adults. Using a community sample of medically healthy Latinx adults living in the New York City metro area, this study found that acculturation stress was indirectly associated with insomnia symptoms via brooding, a type of rumination marked by negative, perseverative thoughts, but not alcohol use. These findings suggest that psychological interventions aiming to reduce brooding may be particularly useful to reduce insomnia symptoms among Latinx adults. Future studies should replicate these mediation models using longitudinal study design to determine the temporal relationships among acculturation stress, coping strategies, and insomnia symptoms among Latinx adults.

Figure 3.1

Models of Indirect Effects of Acculturation Stress on Insomnia Symptoms via Rumination and via Alcohol Use
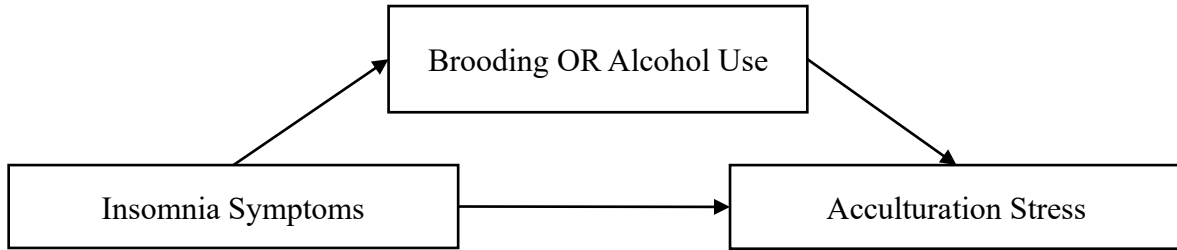
Table 3.1

Sociodemographic and Psychosocial Characteristics by Gender of Latinx adults participating in LASH (N=187)

	All (N=187)		Women (N=120, 64.17%)		Men (N=67, 35.83%)		X or F	p-value
	M/ N	SE/%	M/ N	SE/%	M/ N	SE/%		
Age, y (min 19, max 71)	37.43	13.67	36.74	13.20	38.66	14.49	1.21	0.36
Socio-economic status								
Above poverty threshold	130	69.52	81	67.50	49	73.13	0.64	0.42
At or Below poverty threshold	57	30.48	39	32.50	18	26.87		
Education Attainment								
Less than high school	9	4.81	5	4.17	4	5.97	2.97	0.81
Some high school	9	4.81	5	4.17	4	5.97		
High school diploma/GED	12	6.42	8	6.67	4	5.97		
Trade school/ vocational school	7	3.74	3	2.50	4	5.97		
Some College	22	11.76	14	11.67	8	11.94		
College graduate	78	41.71	54	45.00	24	35.82		
Graduate school/professional school	50	26.74	31	25.83	19	28.36		
Nativity status								
Immigrant	110	58.82	70	58.33	40	59.70	0.03	0.86
US-born	77	41.18	50	41.67	27	40.30		
Heritage Group								
Mexican/ Mexican American/Chicano	29	15.51	15	12.50	14	20.90	9.42	0.15

	All (N=187)		Women (N=120, 64.17%)		Men (N=67, 35.83%)		X or F	p-value
	M/ N	SE/%	M/ N	SE/%	M/ N	SE/%		
Puerto Rican	19	10.16	14	11.67	5	7.46		
Cuban	2	1.07	0	0	2	2.99		
Central American	9	4.81	5	4.17	4	5.97		
South American	58	31.02	37	30.83	21	31.34		
Dominican	57	30.48	42	35.00	15	22.39		
More than 1 ethnicity	13	6.95	7	5.83	6	8.96		
Acculturation Stress Score (min 0, max 59)	9.28	9.51	9.85	9.05	8.23	10.26	1.29	0.27
Alcohol Use								
Number of alcoholic beverages in a typical week (min 0, max 45)	2.61	4.68	1.86	2.7	3.97	6.45	6.18	0.0029
Number of days binge drinking in past 4 weeks (min 0, max 12)	0.64	1.47	0.46	0.99	1.01	2.02	4.16	0.0083
Self-reported drinker category								
Non-drinker	56	29.95	42	35.00	14	20.90	8.74	0.068
Light drinker	84	44.39	52	43.44	31	46.27		
Light to moderate drinker	29	15.51	18	15.00	11	16.42		
Moderate drinker	17	9.09	8	6.67	9	13.43		
Moderate to heavy drinker	2	1.07	0	0	2	2.99		
Heavy drinker	0	0	0	0	0	0		

	All (N=187)		Women (N=120, 64.17%)		Men (N=67, 35.83%)		X or F	p-value
	M/ N	SE/%	M/ N	SE/%	M/ N	SE/%		
Brooding Score (min 5, max 20)	9.44	2.88	9.56	2.86	9.24	2.93	1.05	0.47
Insomnia Severity Index (min 0, max 23)	6.65	5.51	6.97	5.86	6.07	4.81	0.67	0.29
General Perceived stress score (min 0, max 14)	4.96	3.11	4.96	2.98	4.97	3.35	1.27	0.98

Figure 3.2

Unadjusted Indirect Effects of Acculturation Stress on Insomnia Symptoms via Brooding among Latinx adults (N=187)
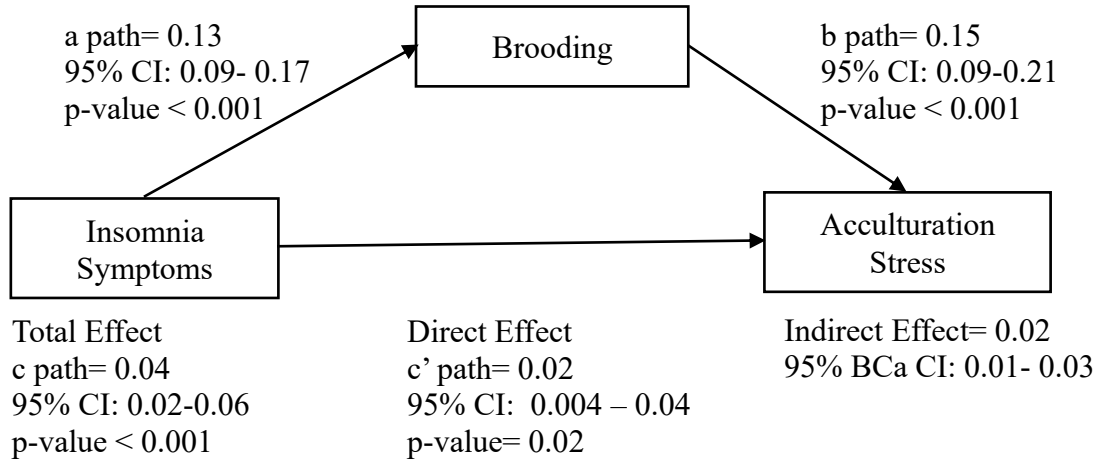
a path= 0.13
95% CI: 0.09- 0.17
p-value < 0.001

Brooding

b path= 0.15
95% CI: 0.09-0.21
p-value < 0.001

Insomnia
Symptoms

Acculturation
Stress

Total Effect
c path= 0.04
95% CI: 0.02-0.06
p-value < 0.001

Direct Effect
c' path= 0.02
95% CI: 0.004 – 0.04
p-value= 0.02

Indirect Effect= 0.02
95% BCa CI: 0.01- 0.03

Figure 3.2

Unadjusted Indirect Effects of Acculturation Stress on Insomnia Symptoms via Typical Alcohol Use among Latinx adults (N=187)

a path= -0.02
95% CI: -0.09- 0.05
p-value= 0.58

Total Alcoholic Drinks

b path= 0.04
95% CI: 0.001-0.07
p-value=0.05

Acculturation Stress

Insomnia Symptoms

Total Effect
c path= 0.04
95% CI: 0.02-0.06
p-value< 0.001

Direct Effect
c' path= 0.04
95% CI: 0.03-0.06
p-value<0.001

Indirect Effect = -0.001
95% BCa CI: -0.004- 0.002
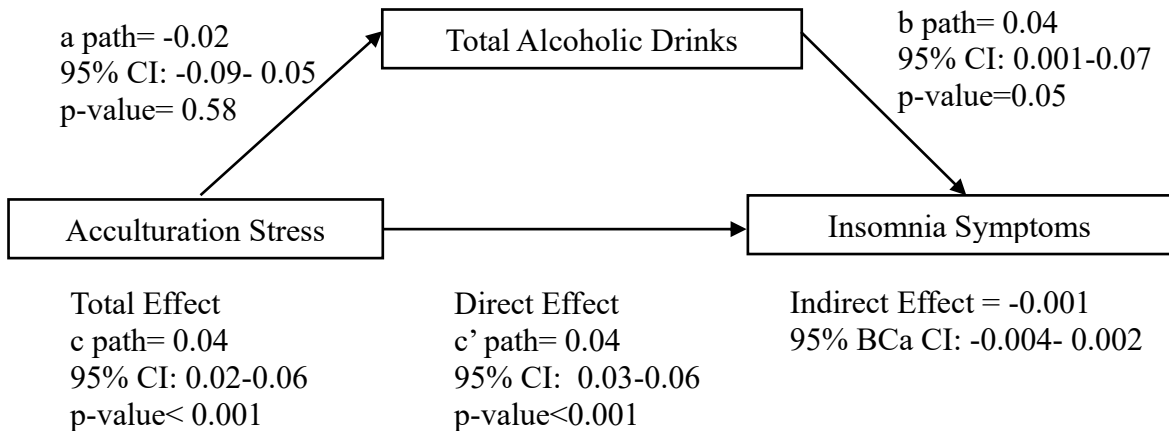
Figure 3.4

Unadjusted Indirect Effects of Acculturation Stress on Insomnia Symptoms via Binge Drinking among Latinx adults (N=187)

a path= -0.002
95% CI: -0.03- 0.02
p-value= 0.82

Days Binge Drinking

b path= 0.11
95% CI: 0.001-0.22
p-value=0.05

Acculturation Stress

Insomnia Symptoms

Total Effect
c path= 0.04
95% CI: 0.02-0.06
p-value <0.001

Direct Effect
c' path= 0.04
95% CI: 0.03-0.06
p-value <0.001

Indirect Effect = -0.0003
95% BCa CI: -0.003- 0.002

Table 3.2

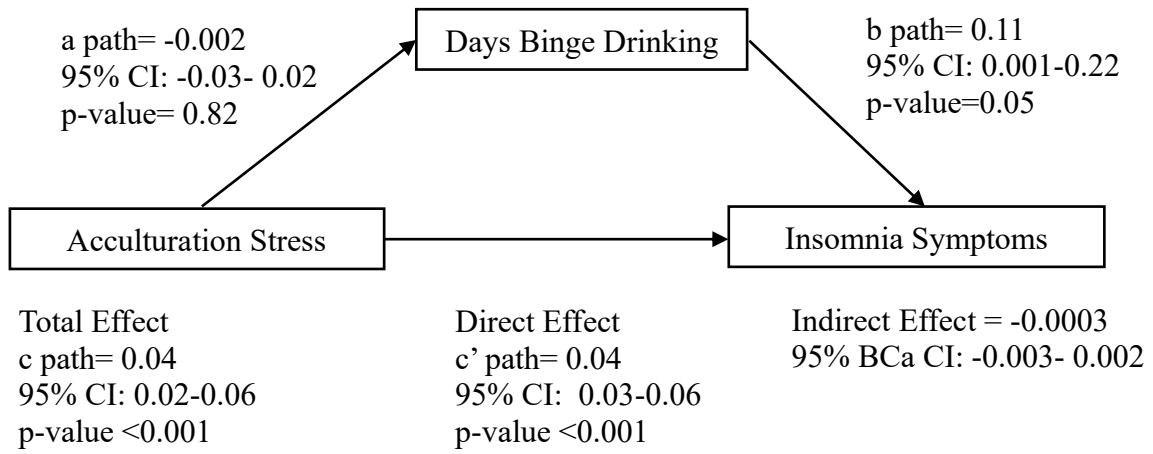*The Total, Direct, and Indirect Effects of Acculturation Stress on Insomnia Symptoms through Brooding among Latina Women (N=120) and Latino Men (N=67)*

	IV to M[1]		M to DV[2]		Total Effects		Direct Effects		Indirect Effects	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% BCa CI
Women (N=120)										
Unadjusted Model	0.13***	0.08-0.20	0.17***	0.12-0.25	0.04***	0.02-0.06	0.02	-0.01-0.04	0.02*	0.01-0.04
Fully Adjusted Model[3]	0.14***	0.09-0.20	0.19***	0.12-0.26	0.04**	0.02-0.06	0.01	-0.01-0.04	0.03*	0.02-0.05
Men (N=67)										
Unadjusted Model	0.12***	0.07-0.28	0.12*	0.02-0.20	0.04***	0.01-0.06	0.03*	0.002-0.05	0.01*	0.004-0.04
Fully Adjusted Model[3]	0.14***	0.09-0.29	0.09	-0.03-0.18	0.06	0.03-0.08	0.04**	0.04-0.07	0.01*	-0.002-0.03

*Note: [1]IV to M→ IV= Acculturation Stress; M= Brooding; [2]DV to M →DV= Insomnia Symptoms, M= Brooding; Fully Adjusted Models include age, NYC poverty threshold status, and general perceived stress ; ; *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.10*

Table 3.3

The Total, Direct, and Indirect Effects of Acculturation Stress on Insomnia Symptoms through Alcoholic Beverages Consumed in a Typical Week among Latina Women (N=120) and Latino Men (N=67)

	IV to M[1]		M to DV[2]		Total Effects		Direct Effects		Indirect Effects	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% BCa CI
Women (N=120)										
Unadjusted Model	0.01	-0.05-0.12	0.06	0.004-0.13	0.04***	0.02-0.06	0.04**	0.01-0.06	0.001	-0.004-0.01
Fully Adjusted Model[3]	0.02	-0.04-0.07	0.05	-0.03-0.13	0.04***	0.02-0.06	0.04***	0.02-0.06	0.001	-0.003-0.01
Men (N=67)										
Unadjusted Model	-0.05	-0.21-0.12	0.03^	-0.004-0.07	0.04***	0.02-0.07	0.04***	0.02-0.07	-0.002	-0.01-0.002
Fully Adjusted Model[3]	-0.04	-0.21-0.13	0.03^	-0.001-0.07	0.06***	0.03-0.08	0.06***	0.03-0.08	-0.001	-0.01-0.003

Note: [1]IV to M→ IV= Acculturation Stress; M=Total Drinks Consumed ; [2]DV to M → DV= Insomnia Symptoms, M= Total Drinks Consumed; Fully Adjusted Models include age, NYC poverty threshold status, and general perceived stress; *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.10.

Table 3.4

The Total, Direct, and Indirect Effects of Acculturation Stress on Insomnia Symptoms through Days Binge Drinking among Latina Women (N=120) and Latino Men (N=67)

	IV to M[1]		M to DV[2]		Total Effects		Direct Effects		Indirect Effects	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% BCa CI
Women (N=120)										
Unadjusted Model	0.01	-0.01-0.03	0.13	-0.04-0.31	0.04***	0.02-0.06	0.04**	0.02-0.06	0.001	-0.004-0.01
Fully Adjusted Model[3]	0.02	-0.04-0.07	0.05	-0.03-0.13	0.04**	0.02-0.06	0.04**	0.06-0.29	0.001	-0.003-0.01
Men (N=67)										
Unadjusted Model	-0.01	-0.06-0.35	0.11^	-0.01-0.24	0.04***	0.02-0.08	0.04*	0.02-0.07	-0.002	-0.01-0.001
Fully Adjusted Model[3]	-0.04	-0.21-0.13	0.03	-0.002-0.07	0.06***	0.03-0.08	0.06***	0.03-0.08	-0.001	-0.01-0.003

Note: [1]IV to M→ IV= Acculturation Stress; M= Days Binge Drinking; [2]DV to M → DV= Insomnia Symptoms, M= Days Binge Drinking; [3]Fully Adjusted Models include age, NYC poverty threshold status, and general perceived stress; $*** p<0.001$, $** p<0.01$,

Table 3.5

The Total, Direct, and Indirect Effects of Insomnia Symptoms on Acculturation Stress through Brooding in the Aggregate Sample (N=187), among Latina Women (N=120), and Latino Men (N=67)

	IV to M[1]		M to DV[2]		Total Effects		Direct Effects		Indirect Effects	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% BCa CI
Aggregate Sample										
Unadjusted Model	0.23***	0.16-0.30	0.21***	0.14-0.29	0.09***	0.05-0.13	0.04*	0.004-0.08	0.05*	0.03-0.07
Women										
Unadjusted Model	0.21***	0.14-0.30	0.20***	0.10-0.29	0.07**	0.02-0.11	0.02	-0.02-0.07	0.04*	0.01-0.08
Men										
Unadjusted Model	0.27***	0.13-0.40	0.22***	0.10-0.35	0.16***	0.09-0.23	0.10**	0.02-0.18	0.06*	0.03-0.11

Note: [1]*IV to M→ IV= Insomnia Symptoms; M= Brooding;* [2]*DV to M → DV= Acculturation Stress, M= Brooding;* *** *p<0.001,* ** *p<0.01,* * *p<0.05,* ^ *p<0.10.*

Table 3.6

The Total, Direct, and Indirect Effects of Insomnia Symptoms on Acculturation Stress through Alcoholic Beverages Consumed in a Typical Week in the Aggregate Sample (N=187), among Latina Women (N=120), and Latino Men (N=67)

	IV to M[1]		M to DV[2]		Total Effects		Direct Effects		Indirect Effects	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% BCa CI
Aggregate Sample (N=187)										
Unadjusted Model	0.11 ^	-0.01-0.24	-0.02	-0.07-0.02	0.09***	0.05-0.13	0.10***	0.06-0.13	-0.003	-0.01-0.002
Women (N=120)										
Unadjusted Model	0.04	-0.04-0.13	0.02	-0.08-0.12	0.07**	0.02-0.11	0.06**	0.02-0.11	0.001	-0.004-0.01
Men (N=67)										
Unadjusted Model	0.36 *	0.02-0.69	-0.04	-0.10-0.01	0.16***	0.09-0.23	0.17***	0.10-0.25	-0.02	-0.06-0.004

Note: [1]*IV to M→IV= Insomnia Symptoms; M= Alcoholic Beverages Consumed in a Typical Week;* [2]*DV to M →DV= Acculturation Stress, M= Alcoholic Beverages Consumed in a Typical Week; *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.10.*

Table 3.7

The Total, Direct, and Indirect Effects of Insomnia Symptoms on Acculturation Stress through Days Binge Drinking in the Aggregate Samples (N=187), among Latina Women (N=120), and Latino Men (N=67)

	IV to M[1]		M to DV[2]		Total Effects		Direct Effects		Indirect Effects	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% BCa CI
Aggregate Sample (N=187)										
Unadjusted Model	0.03	-0.01-0.07	-0.02	-0.17-0.12	0.09***	0.05-0.13	0.09***	0.06-0.13	-0.001	-0.01-0.002
Women (N=120)										
Unadjusted Model	0.02	-0.01-0.05	0.18	-0.09-0.44	0.07**	0.02-0.11	0.06**	0.02-0.11	0.003	-0.001-0.02
Men (N=67)										
Unadjusted Model	0.08	-0.02-0.18	-0.10	-0.28-0.07	0.16***	0.09-0.23	0.17***	0.09-0.24	-0.01	-0.05-0.003

Note: [1]IV to M→ IV= Insomnia Symptoms; M= Days Binge Drinking; [2]DV to M → DV= Acculturation Stress, M= Days Binge Drinking; *** p<0.001, ** p<0.01, * p<0.05, ^ p<0.10.

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Appendix

Appendix A

Semi-Structured Focus Group Interview Guide Highlighting Questions Analyzed in Thematic Content Analysis

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INTERVIEW GUIDE FOR INSOMNIA FOCUS GROUPS

INTRODUCTION TO FOCUS GROUP MEMBERS: Focus groups are semi-structured discussions with groups of 4-12 people that aim to explore a specific set of issues. Group moderators, today that will be me (insert name) begin by asking broad questions about the topic of interest, and ask more and more focused questions. Although you can directly answer the questions, everyone is encouraged to discuss and interact, so that we can benefit both from your own experiences and perceptions, and also new ideas that we generate together.

This discussion will be audio-recorded but no personally identifiable information will be used. There are no right or wrong answers so you should feel comfortable sharing your candid opinions and experiences. None of the information that you share with us will affect your treatment with your service providers or your relationship with New York Presbyterian Hospital (NYP) if you receive medical services at NYP. We are recording it so we can be sure we get the information exactly right. That is, we have a record of what was actually said, not what we think we heard or what we remember. I am going to record myself doing the introduction so I will turn the tape recorder on now.

PURPOSE: The purpose of this discussion is to collect your opinions, ideas, and suggestions about how best to treat insomnia. During today's focus group, we will discuss what factors contributed to your experience with insomnia, your treatment preferences, and interest in certain types of insomnia treatments. There are no right or wrong answers so you should feel comfortable sharing your opinions and experiences, and discussing this with others in the group. The ideas and opinions that you express during this discussion will be very helpful to us in identifying approaches to treatment that are most helpful and important to you to treat your insomnia.

I. YOUR EXPERIENCE OF INSOMNIA
Chronic insomnia is a common health condition that affects millions of adults in the United States. All of you in this room have identified currently experiencing symptoms of insomnia.

Q1. To get us started, let's go around the room and just say your first name and how long you have had symptoms of insomnia?

Q2. What factors would you say contributed most to the start of your insomnia? What factors would you say contribute to the continuation of your insomnia?

Q3. Have specific factors related to your ethnicity, race, identity, socioeconomic status, language fluency, or neighborhood contributed to your insomnia? Why or why not?
[Moderator should probe about experiences of racism, discrimination, or immigration stress in relation to insomnia]

II. TREATMENT HISTORY, BARRIERS, AND FACILITATORS
Q3. Have you ever received treatment for your insomnia? Why or Why not?
- o **If so, what kind of treatment did you receive?** Moderator should probe about pharmacological, behavioral, and psychological treatments for insomnia.

Q4. [If not answered or unclear] Have you ever received mental health treatment for your insomnia?

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Q5. What prevented you or got in the way of you seeking treatment?

IV. PREFERENCES AND ACCEPTABILITY TO ONLINE TREATMENT
Cognitive behavioral therapy for insomnia (or CBT-I), a psychological and behavioral treatment is the recommended first-line of treatment for chronic insomnia that has been shown to be more effective than medications in reducing, and in many cases, eliminating insomnia in the long-term. CBT-I combines cognitive therapy to address maladaptive beliefs and expectations about sleep, with behavioral treatments (e.g., sleep restriction, stimulus control), often implemented over the course of 6-8 weeks. Does anyone have any questions before we move on to discuss this type of treatment? [Moderator distributes CBT-I handout to participants]

Q6. How likely would you be to participate in this type of treatment? Why or why not? For what reasons might you participate or not?

Q7. An important component of CBT-I is learning relaxation skills to decrease stress. What types of specific stressors would be important to address in this type of treatment? Why or why not?

Although behavioral treatments for insomnia are preferred, access to high quality behavioral health care services are limited, and this is especially true for limited English proficiency Hispanic patients. For Latina/os, this implies that access to in-person treatment of CBT-I is not a valid option for most Spanish speakers. There are now new online treatment versions of CBT-I that provide this type of treatment over the Internet.

Q6. What do you see as the advantages of participating in this type of treatment?

Q7. What might be some disadvantages or challenges?

Q8. How likely would you be to participate in this type of online treatment? Why or why not? For what reasons might you participate or not? What would make it easier for you to participate?

Q9. For whom do you see this type of treatment as most useful?

Q10. If you were to participate in this online treatment, would you
   (a) be willing to complete a sleep diary online each day? Why or why not?
   (b) be willing to complete a 45-60 minute online session for 6 weeks? Why or why not?
        a. Where would you complete the online sessions? At home? At Work? At the library?
   (c) be willing to do " homework" to improve your sleep (e.g., change your sleep and wake time, etc.)
   (d) be willing to pay for the online treatment? Why or why not? If yes, how much would you pay for this treatment?

V: FINAL THOUGHTS
Q11. Given our discussions today, what additional recommendations do you have as we continue to explore acceptability for and delivery of effective online insomnia treatment?

Thank you so much for your participation.

Appendix B

Codebook used to Examine the Influence of Social Processes on the Lived Experience of Insomnia among Latinx adults

Parent nodes	Child nodes	
Predisposing factors of insomnia	Social support	
	Social stress	
	Social Control	
	Personal Control	
	Symbolic meaning	
	Age	
Precipitating factors of insomnia	Social support	Physical health conditions
	Social stress	Shift work
	Social Control	Mental health and emotional issues
	Personal Control	Impactful live events
	Symbolic meaning	Immigration
Perpetuating factors of insomnia	Social support	Physical health conditions
	Social stress	Mental health and emotional issues
	Social Control	Lifestyle changes
	Personal Control	Immigrant experiences
	Symbolic meaning	Environmental factors
	Rumination	Economic concerns

Parent nodes	Child nodes	
	Poor sleep hygiene	
Influential Social Relationships and Contexts	Family	Pets
	Friends	Other
	Spouse or romantic partner	
	Work colleagues or Work environment	
	Neighbors or Neighborhood	
Coping with insomnia	Social support	Prayer
	Social stress	Mental health therapy
	Social control	Medication
	Personal control	Distractions
	Symbolic meaning	Complementary alternative medicine
Insomnia effects on Social relationships	Social support	
	Social stress	
	Social control	
	Personal control	
	Symbolic meaning	

Appendix C

Frequency in which Social Tie Domains were Coded in Segments also Coded for Social Processes

	Number of Segments Coded
Family	89
Spouse/ Romantic Partner	60
Work colleagues or Work environment	22
Neighbors or Neighborhood	12
Others	12
Friends	3
Pets	2