Are Familism Values, Family Communication, and Sleep Associated with Depressive

Symptoms?

An Investigation of Latino Youth Well-being over the Transition to College

by

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ABSTRACT

The transition out of high school is a major milestone for adolescents as they earn greater autonomy and responsibilities. An estimated 69.2% of adolescents enroll in higher education immediately following high school completion, including increasing numbers of Latino adolescents (National Center for Education Statistics, 2016). Integrative model (García Coll et al., 1996) suggests a need for research on promotive and protective contextual factors for ethnic minority children and adolescents. Guided by the model, the proposed research will explore a salient Latino cultural value, familism, and family communication as predictors of changes in depressive symptoms from high school to university among Latino adolescents (N = 209; 35.6% male; Mage=17.59, SD=.53). Furthermore, sleep, a key bioregulatory mechanism, was explored as a potential moderator of these processes (Dahl & El-Sheikh, 2007). On average, familism values were not associated with college depressive symptoms, but family communication was significantly negatively associated with college depressive symptoms. Neither sleep duration nor sleep problems significantly moderated the association between familism values and college depressive symptom. Patterns were similar for family communication. The interaction between sleep problems and familism-support values were significantly associated with college depressive symptoms. However, when simple slopes were probed, none were significant.

This is sincerely dedicated to DREAMers.
#HereToStay

ACKNOWLEDGMENTS

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Transition periods are recognized as times of heightened stressors (Lerner, 2006),

and transitioning from high school to college is no exception (Juster et al., 2011; Lerner,

2006). Both academic and general life stressors are associated with higher rates of

depression, suicidal ideation, and anxiety among college students (Lester, 2014; Kitzrow,

2003); according to the American College Health Association (2016), 23.2% of college

students reported anxiety, 15.4% reported depression, and 31.8% reported stress as

factors influencing their functioning within the past 12 months. Latino youth have been

identified as a subgroup that may experience greater psychological distress, suicidal

ideation, anxiety, and depression on average (Anderson & Mayes, 2010; Hwang & Goto,

2009; Polo & Lopez, 2009; Wight, Aneshensel, Botticello, & Sepulveda, 2005; Zahn-

Waxler, Shirtcliff, & Marceau, 2008).

While many studies have identified potential physiological and health behavior

(e.g. sleep, poor diet, lack of exercise; Doane, Gress-Smith, & Breitenstein, 2015; Hoare

et al., 2014; Nyer et al., 2013), as well as early adversity experiences (e.g. high school

bullying, food insecurity, perceived neighborhood hazards; Aneshensel & Sucoff, 1996;

Klomek et al., 2011; Weinreb et al., 2002) as risk factors for depressive symptoms in

early-mid adolescence, fewer studies have examined protective and promotive factors

associated with depressive symptoms over the transition into college. As such, the present

study explored socio-cultural strengths that were identified as protective factors for

Latino communities (i.e. familism values; Sabogal, Marin, Otero-Sabogal, Marin, &

Perez-Stable, 1987) and among broader communities (family communication; Olson &

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Barnes, 2004) in previous research. In addition to examining how familism values and family communication predicts change in internalizing symptoms, the present study explored biological mechanisms (i.e. objective and subjective sleep) that may assist in promoting more positive psychological well-being for Latino adolescents during their transition into new academic settings. Examining such processes can help us understand how to promote academic equity as Latinos are the ethnic minority group most represented in institutions of higher education, yet also the ethnic minority group least likely to graduate with a Bachelor's degree (NCES, 2015).

Although adolescence is characterized as a stage of developing independent, adult-like autonomy (Meeus et al., 2005), family members continue to play a significant role, especially among communities that emphasize the importance of family interdependence, communication, and involvement that are typically warm, close, and supportive (Davidson & Cardemil, 2008; Martinez et al., 2015; Noack, Kerr, & Olah, 1999). Such family relationships exist across different cultural communities in varied expressions (Miles et al., 2012), but a great deal of research has identified the importance of such values among Latino families (Campos, Perez, & Guardino, 2010). The cultural value of loyalty, reciprocity, and solidarity among family members is typically referred to as familism values (Campos, Ullman, Aguilera, & Dunkel Schetter, 2014; Sabogal et al., 1987). Family -obligation, -referent, and -support are the three most prominent cultural values that sum to characterize what researchers refer to as familism values (Calzada et al., 2012; Knight et al., 2009).

Similar to family relationships, familism values have been identified as a promotive factor for Latino adolescents' mental health in several studies (Calzada,

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Tamis-LeMonda, Yoshikawa, 2012; Gonzales, Fabrett & Knight, 2009; Ornelas & Perreira, 2011). Such findings further support the need to examine how socio-cultural values and relationships prior to stressful transition periods could promote positive mental health or protect developing adolescents from stressors associated with transitioning to higher learning institutions. As such, the present study explored if Latino adolescents' endorsement of familism values during high school, prior to entering a four-year postsecondary institution, were associated with changes in well-being across the college transition. In addition to understanding the role of familism values broadly, cultural psychologists have called upon the need to examine how the subcomponents of familism values influence adolescent development of depressive symptoms differently than the overall familism values (Sabogal et al., 1987). Therefore, the present study also explored each of the subcomponents of familism values as predictors of depressive symptoms during the transition from high school to four-year college.

Both the quality of family relationships and familism values have been linked with fewer depressive symptoms in studies of Latino youth (Calzada, Tamis-LeMonda, & Yoshikawa, 2012; Gonzales, German & Fabrett, 2012). Often, the associations between family relationships and familism values with depressive symptoms are examined in separate models, even though the family relationship is embedded within the culturally structured environment (Zeiders, Updegraff, Umaña-Taylor, McHale, & Padilla, 2016). Indeed, it may be important to look at both within the same model. Researchers have yet to examine if these two constructs predict indices of well-being (e.g., fewer depressive symptoms) during the critical transition period of high school to college. The proposed research will address this gap in the extant literature through examining family

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relationships (i.e., family communication) and familism values simultaneously among a Latino adolescent sample transitioning out of high school and into college.

Researchers have hypothesized that sleep may be an important promotive, protective, and restorative biological mechanism during adolescence (Dahl & Lewin, 2002). High quality and longer sleep duration has been associated with greater memory consolidation, emotion regulation, physical and psychological well-being, academic achievement, and daytime productivity (Baum, Desai, Field, Miller, Rausch, & Beebe, 2013; Fuligni & Hardway, 2006; Gregory & Sadeh, 2012; Mercer, Merritt, & Cowell, 1998; Wolfson & Carskadon, 1998). Despite the benefits of sleep, studies have found that sleep behavior is not consistent from high school and college and is significantly predictive of anxiety and depressive symptoms during first year of college (Doane, Gress-Smith, & Breitenstein, 2015). Not surprisingly, adolescence is a vulnerable period for insufficient sleep due to a combination of both intrinsic (i.e. maturational changes, endocrine changes associated with puberty) and extrinsic factors (i.e. academic responsibilities, social pressures, early school times; Carskadon, 2002; Dewald, Meijer, Oort, Kerkhof, & Bogels, 2010; Hansen, Janssen, Shiff, Zee, & Dubocovich, 2005). Unfortunately, adverse correlates of poor sleep include increased symptoms of depression, vulnerability to adjustment problems, and heightened risk-taking behaviors (El-Sheikh, Tu, Saini, Fuller-Rowell, & Buckhalt, 2015; Kandel & Davies, 1982; Venkatraman, Chuah, Huettel, & Chee, 2007).

As researchers have come to better understand the role of sleep in the prediction of adolescent health and adjustment outcomes, developmental scientists have recognized the need to explore the biobehavioral mechanism of sleep within the family context (Dahl

& El-Sheikh, 2007). While many studies have examined how qualities of parenting or the parent-child relationship are associated with sleep in early or middle childhood (e.g., Adam, Snell, & Pendry, 2007; Fiese, Winter, Sliwinski, & Anbar, 2007; Milan, Snow, & Belay, 2007), few have examined such associations within the broader family context, during adolescence, or whether sleep may function as a promotive factor or serve as a stress-buffering mechanism. Examining the interplay of this biological mechanism with qualities of the socio-cultural context may provide important information about how to promote well-being among Latino adolescents who are transitioning to college.

Theoretical Overview

The integrative model. The integrative model for the study of development competencies in minority children (García Coll et al., 1996) incorporates social class, culture, ethnicity, and race as a part of a theoretical framework for examining ethnic minority child development. A strength of the present study is the exploration of developmental outcomes of Latino adolescents utilizing a homogenous sample (i.e., inclusion criteria was participants individually identifying as Latino). In addition to the sampling method, the present study incorporates the consideration of family dynamic (e.g., family communication) and community culture (e.g., familism values). The present study also investigates Latino adolescents longitudinally, which is encouraged by the integrative model in recognition of the salient ecological and cultural variances that contribute to developmental processes, as well as individual differences. Within this framework, García Coll and colleagues proposed eight constructs that interact with one another to address two major considerations when studying the development of minority children. One, it constructs the unique variance of development for children of color and

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two, it constructs common and unique factors that affect developmental process at the community and individual level.

The scope of the integrative model is broad (García Coll et al., 1996). The present research draws from the last two constructs within the integrative model which are child characteristics and family. These two reflect the general framework of development proposed by the ecological model (Bronfenbrenner, 1979): the individual is placed at the center of the relationships of constructs, microsystem which includes family, and the mesosystem which encompasses the interaction between the microsystems and how it influences the individual. The difference between the two models is the attention to issues of race, ethnicity, and culture within the integrative model.

García Coll and colleagues (1996) argued that minority children have certain characteristics that distinguish them from the majority and that both inhibit and promote overall development. The theory posits that the minority status of the child is a part of their individual child characteristics; biological systems interact with life experiences which subsequently influence developmental outcomes, such as mental health trajectories (Mistry, Minkovitz, Riley, Johnson, Grason Dubay, & Guyer, 2012). This guides the present study's interest of examining how Latino family and cultural practices provide support to Latino adolescents who are transitioning into the new academic environment.

Family is an integral part of child development. García Coll et al. (1996) referenced family relationships as central sources of influence of child and adolescent development. Studies have found that family relationships continue to be a salient construct for Latinos living in the United States (Bermudez, Kirkpatrick, Hecker, & Torres-Robles, 2010). As such, the present study explored an aspect of family

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relationship (i.e. perceived family communication) to predict changes in internalizing symptoms across a transition from high school to college. In addition to exploring family communication, the present study also explored a salient cultural value among the Latino population (i.e., familism values). Cultural values and family relationships are not independent of each other; culture influences family dynamics or styles of communication within a family (Causadias, 2013). Therefore, the present research will examine perceived quality of family communication and familism values within the same regression model to evaluate the unique contributions of these different aspects of family processes.

Developmental systems theory. Developmental systems theory (DST) recognizes the dynamic complexity of developmental processes. It emphasizes the importance of the entire system of development which includes all biological and environmental resources available to the organism (Ford & Lerner, 1992; Marshall, 2013). Through the use of multi-level analysis, DTS emphasizes the need to examine development within a holistic context.

There are several defining features of DST. First is the relational meta-model which replaces dichotomizations or other forms of partitioning with systemic syntheses or integrations. The integration of different levels of organization such as biological, physiological, cultural, and historical factors within the ecology of human development provides agency to cultural values (i.e., familism values), behaviors (i.e., family communication), and biobehavioral mechanisms (i.e., sleep) as regulators of development. This theory is relevant to the present study as it presents a theoretical philosophy on development (Ford & Lerner, 1992). It recognizes changes within a

lifespan, but the magnitude of plasticity is relative to situation, context, and the individual. These differences promote individual differences and diversity which is a substantive feature of human development.

Expanding on DST, the cross-level dynamic biocultural coconstructive framework of development integrates levels of time and levels of interactive process within the dynamic of the interlocked developmental process (Li, 2003). It identifies individuals as recipients of biocultural influences as well as active participants of the process. This theory suggests that individuals have the ability to make adaptive decisions across periods of microgenesis and life span ontogeny to regulate bicultural influences within immediate individual and social situational contexts.

The present study draws from these frameworks to examine associations among Latino cultural values (familism values: support, obligation, and referent), family relationships (family communication) and biobehavioral mechanisms (i.e., sleep) on changes in well-being over an important transition period. Furthermore, the study proposes to examine these mechanisms across a key transition between sociocultural contexts for Latino youth, the transition from high school to college.

Familism Values and Depressive Symptoms

Familism values, a strong cultural value within Latino communities, is portrayed through a sense of responsibility, loyalty, and solidarity among family members (Sabogal, Marin, Otero-Sabogal, Marin, & Perez-Stable, 1987). Latino families tend to report higher levels of familism values than European-Americans (Knight, Virdin, & Roosa, 1994; Vazquez-Garcia, García Coll, Erkut, Alarcon, & Tropp, 2000), and studies have illustrated that certain dimension of familism values (-obligation) have high

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intergenerational stability among Latino communities (Phinney, Ong, & Madden, 2000). Greater endorsement of familism values among Latino adolescents has been associated with lower reports of depressive symptoms (Calzada et al., 2012; Stein et al, 2015; Umana-Taylor et al., 2011). For example, Keeler and colleagues (2013) found that higher self-reports of familism values was negatively associated with depression symptomatology and positively associated with perceptions of help-seeking from family.

However, other studies have noted that such relations between familism values and depressive symptoms may be dependent on mediated or moderated pathways. For example, Lorenzo-Blanco and colleagues (2012) found an indirect negative association between familism values and depressive symptoms through the mediating role of low family conflict and high family cohesion. Interestingly, Cupito and colleagues (2016) concluded that the protective effect of familism values for the development of depressive symptoms was only significant among adolescents who reported low levels of school support, whereas, adolescents who reported high levels of school support reported low depressive symptoms regardless of familism values.

Researchers have also examined familism values as a protective or stress-buffering mechanism. Stein and colleagues (2013) found that higher endorsement of familism values was positively associated with psychological outcomes and fewer depressive symptoms, but only in the absence of stressors such as discrimination or acculturative stress. The conclusions of this study suggested that the positive impacts of familism values may depend on environmental circumstances. Finally, in one of the only longitudinal studies of familism values and depressive symptoms, Smokowski and colleagues (2010) found that familism values was negatively associated with depressive

symptoms over time, but that greater parent-adolescent conflict suppressed the beneficial impact of the cultural value. In sum, these studies suggest the importance of examining associations between familism values and depressive symptoms within a broader context and over time, including over important periods of transition.

Subcomponents of familism values. While most research examining associations between familism values and depressive symptoms has focused on it as one unique cultural value construct, some research suggests that it may be important to understand the subcomponents of familism values separately. For example, a recent meta-analysis systematically reviewed 39 studies, published within 2005 to 2015, and assessed the relations between familism values and five mental health outcomes (i.e. depression, suicide, substance abuse, internalizing, and externalizing behaviors) in Latino samples living in the United States. Thirty out of 39 were of studies sampled across the early- to late- adolescent period (Valdivieso-Mora, Peet, Garnier, Salazar, & Johnson, 2016). Among these five outcomes, familism values predicted three: internalizing behaviors (d=0.33), suicide (d=0.20), and depression (d=0.21); there was not a significant main effect of familism values on externalizing behaviors and substance abuse across studies. Across these 39 studies, there were three studies that reported associations between familism values and outcomes (e.g., depressive symptoms and internalizing symptoms) separately for the three subcomponents (i.e. family- obligation, support, and referent; Campos et al., 2014, Cavanaugh, 2015, Zeiders et al., 2013). These studies reported slightly larger effect sizes which encouraged future studies to examine the role of these subcomponents. The three subcomponents include: family support, family obligation, and family as referent (Knight et al., 2009). These values are defined as such: family support is the belief of family

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cohesion and the desirability to maintain a close family relationship among the members; family obligation is the belief that as a member of a family, one is responsible of providing care for other members of the family; and family referent is the belief that personal behaviors should align with the expectations of the family (Sabogal et al., 1987; Marsiglia, Parsai, & Kulis, 2009).

  Family obligation. Family obligation's contribution to adolescent development is complex. Latino communities place emphasis on familism values as a shared cultural value of which, family obligation is an important subcomponent (Orozco & Orozco, 1995). It is expected that everyone in the family have a contributing role in the family. Latino adolescents are expected to assist and adhere to the needs and wishes of the family by, for example, conducting household chores, taking care of siblings, and providing financial assistance (Fuligni & Pedersen, 2002; Telzer & Fuligni, 2009). Although providing family assistance can be demanding, Telzer & Fuligni (2009) found that such duties may be a meaningful daily routine for Latino adolescents. Importantly, Mexican-origin youth with higher family obligation values showed declines in depressive symptoms and greater self-reported meaning in life in a longitudinal study among adolescents in high school (Telzer, Tsai, Gonzales, & Fuligni, 2015).

  Latino youth may positively internalize their contribution to the family as personally and socially rewarding. To test this theory, Telzer and colleagues (2011) examined Latino and European-American youths' neural activity as they were given a sequence of tasks to make monetary decisions to benefit family members or themselves. When compared to their counterparts, Latino youths' mesolimbic reward system showed greater activation when making a donation to benefit family at the expense of self-

earnings, suggesting that Latino youths feel personally rewarded through service to family. Those who reported greater family obligation values showed higher reward activation when contributing to family (Telzer, Masten, Berkman, Lieberman, & Fuligni, 2011). Such sense of family obligation continues to be maintained within the culture among second and third generations (Fuligni, Tseng, & Lam, 1999).

Despite these findings, other developmental psychopathology studies suggest more complex associations between family obligation and adolescent outcomes. For example, Milan & Wortel (2015) found that family obligation values were associated with fewer externalizing behaviors, but they also magnified associations between exposure to negative life events and depressive symptoms. While other studies found no between- or within-person associations in familism obligations and depressive symptoms among Latino adolescents (Zeiders et al., 2013). Other studies suggest that the cultural expectation of having to take care of the family or placing family's needs into consideration when making personal or professional decisions may be associated with negative mental health outcomes (Parsai et al., 2009; Davila et al., 2011).

Family support. Family support has been recognized as one of the most important and promotive subcomponents of familism values for Latino youth and families with some research suggesting that levels of family support values do not decrease across generations of immigration (Marin & Gamba, 2003, Sabogal et al., 1987). With a sample of 266 Mexican Americans, high school students residing across different regions in the United States, Edwards & Lopez (2006) examined the association between self-reports of perceived family support levels to the participant's overall life satisfaction and psychological well-being. Authors found that high levels of family support were

correlated with greater overall life satisfaction. Another study found within-person and between-family associations with familism support values and depressive symptoms among Latino adolescents; adolescents that characterized their day or their family as having greater familism support values also reported lower depressive symptoms (Zeiders et al., 2013).

More recently, Quiroga and colleagues (2015) examined family support as a protective factor for the development of depression in a sample of Mexican female adolescents who were exposed to violence within their community. They found that greater parental support buffered the effects of the exposure to violence and its association with female adolescent reports of depression. The opposite was true for those that reported low family support; in fact, there was a significant negative association between exposure to violence and reports of depression, moderated by low parental support. Other studies made similar conclusions regarding the reduction or inadequate family support, low levels of family support have been associated with the etiology of internalizing disorders (Licitra-Kleckler & Waas, 1993; Sheeber et al., 1997). Quiroga, Lopez, & Willis' (2015) concluded that only family support, not teacher or peer social support, was protective factor in the association between exposure to violence and depression.

Family referent. Family as referent is the belief that behaviors should meet familial expectations (Berkel et al., 2010; German, Gonzales, & Dumka, 2008; Knight, Carlo, Mahrer, & Davis, 2016). Unlike the previous two subcomponents of familism values, few studies have examined how it may differently contribute to Latino adolescents' development.

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Zeiders and colleagues (2013) examined the roles of the subcomponents of familism values and found that referent familism values was significantly associated with lower reports of depressive symptoms within-person over time, between-siblings, and between-families. Specifically, when Latino adolescents reported higher familism referent values than usual, they also reported lower depressive symptoms. In addition, when a sibling reported greater familism referent value than the other sibling, they also reported lower depressive symptoms. Lastly, when the family was characterized as having greater familism referent values as compared to other families, adolescents reported lower depressive symptoms. These significant findings did not differ by adolescent gender, generational status, or nativity.

In sum, research examining associations between familism values and internalizing symptoms is still in its early stages. Depending on the methodology employed by the researchers, results suggest both negative and non-significant pathways (Valdivieso-Mora, Peet, Garnier, Salazar, & Johnson, 2016). It is possible that the different subcomponents of familism values may be associated differentially with depressive symptoms, therefore this study will examine familism values more globally, as well as the subscales on their own, to identify which subcategories of familism values promote great well-being, particularly for the development of depressive symptoms for Latino adolescents.

Family relationships. Previous researchers have proposed that late-adolescence is a unique "launching period" during which adolescents strive for increased independence and prepare to leave the immediate family system (Bell, 1967; Erikson, 1959). Although late-adolescence is characterized as the stage of developing independent,

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adult-like autonomy (Meeus, Iedema, Maassen, & Engels, 2005), family –especially parents– continue to play a significant role (Hair, Moore, Garrett, Ling, & Cleveland, 2008; Noller & Bagi, 1985). For example, a 14-year longitudinal study, which encompassed the participants' development through early-adolescent to adulthood, found that high-quality parent-adolescent relationships were associated with lower depressive symptoms, higher self-esteem, and higher intimate relationship quality during the transition from adolescents to adulthood in a nationally representative sample (Johnson & Galambos, 2014).

Previous research has focused on varied qualities (e.g., parental monitoring, parental supportiveness) of the parent-adolescent relationship when looking at associations with depressive symptoms. For example, some studies use adolescent self-reports of relationship quality and parental monitoring while others use observational measures of parent-child interactions (Gonzales, Cauce, & Mason, 1996; Steeger & Gondoli, 2013; Weymouth, Buehler, Zhou, & Henson, 2016). Hair and colleagues (2008) suggested that future studies should examine multiple indicators simultaneously such as routine family activities, parental monitoring, and perceived parental supportiveness. Others have identified emotional closeness, communication, autonomy, and conflict as distinguishable aspects of parent-adolescent relationship that should be included in future research (Withers, McWey, & Lucier-Greer, 2017).

Among these various methods of measurement of parent-adolescent relationship, family communication is of main interest for the present study. Positive communication between family members has been associated with decreases in risk-taking behaviors such as unsafe online interactions with strangers (Liau, Khoo, & Ang, 2008), sexual risks

(Whitaker et al., 1999), adjustment problems among adopted adolescents (Rueter &
Koerner, 2008), and substance use (Ennett et al., 2001) across diverse cultural
communities. One study of Latino adolescents found that youth who reported better
communication with their parents reported fewer externalizing behaviors, measured by
Child Behavior Checklist, which provides a standardized measure of behavioral and
emotional problems (Davidson & Cardemil, 2008).

However, fewer studies have explored if there are similar associations between
family communication and depressive symptoms. Further, of those that have been
conducted, the results have been mixed with some studies suggesting negative relations
and others finding no associations. For example, in a predominantly Euro and African
American sample that examined single-mothers' awareness of their adolescents' stressors
found that households with greater mother-child communication, reported by both
adolescents and their single mothers, was associated with lower levels of adolescent
internalizing symptoms (Hartos & Power, 2000). In contrast, a study with a sample of
mixed-ethnic participants with strained family relationship concluded that self-reported
and objective measurements of parent-adolescent communication were not associated
with indicators of adolescent well-being, including depression, delinquency, and
aggression (Withers, McWey, & Lucier-Greer, 2016). Such varied findings and methods
suggest a need for further research with community specific samples to consider how
culture extends beyond a fixed property and may integrate in to individual-level and
social-level behaviors (Causadias, 2013). As such, this study investigated family
communication simultaneously with familism values to understand their unique

contributions to changes in depressive symptoms during the Latino adolescents' transition from high school to college.

Sleep as a bioregulatory mechanism. An accumulation of research has identified that adolescents experience many sleep-related problems, including short durations, lengthy sleep latencies, frequent night-time awakenings and excessive daytime sleepiness (Patten, Choi, Gillin, & Pierce, 2000; Heikkila, Laippala, & Koivikko, 2001; Lui, Buysse, Gentzler, Kiss, Mayer, & Kepornai, 2007). Researchers have increasingly recognized the importance of sleep to maintain a healthy lifestyle. However, largely absent in these studies are examinations of sleep in the context of the family (Dahl & El-Sheikh, 2007). Research has demonstrated that qualities of the family, including perceptions of parental support or stress within the family are associated with children and adolescent sleep. For example, one study examining a nationally representative sample of children and adolescents found that parental strictness and warmth predicted greater hours of sleep (Adam, Snell, & Pendry, 2007). Another study of adolescents and young adults concluded that family life stress was significantly associated with later development of insomnia (Bernert, Merrill, Braithwaite, Van Orden, & Joiner, 2007). A study with a sample of Mexican American youth concluded that parent-youth relationship quality predicted night-to-night sleep variability (Kuo et al., 2014).

Although new within the literature, several studies that have explored the role of sleep within the family context have found patterns of moderation reflecting cumulative or dual risk perspectives (Evans, 2003; Sameroff, 1983). The dual risk perspective suggests that individuals may have a protective factor that reduces risks or a vulnerability that increases risk. Using multiple methods, including subjective self-reports and

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actigraphy, Tu and colleagues (2015) found that low peer victimization was more strongly associated with lower levels of internalizing symptoms among youth who had low levels of sleep-wake problems as compared to youth with higher sleep-wake problems. Lemola and colleagues (2012) also found that sleep duration moderated the positive association between interparental conflict and early adolescent's aggression; adolescents who reported a large difference between weekday to weekend sleep duration (short sleep duration during weekdays and long sleep duration during weekends) were more vulnerable to early adolescent aggression and interparental conflict as compared to youths with a more stable sleep duration throughout the weekdays and weekends. Finally, El-Sheikh and colleagues (2015) found that adolescents with long sleep duration in conjunction with low levels of perceived racial discrimination reported the lowest levels of internalizing symptoms, as compared to adolescents who had lower sleep durations and low levels of perceived racial discrimination.

A competing framework to the dual risk perspective is the protective-reactive pattern of effects (Luthar et al., 2000) which emphasizes that a protective attribute, such as sleep, is beneficial in low stress contexts, but less so in high stress contexts. Previous studies have found that longer and better quality of sleep is only beneficial for youth outcomes (e.g., internalizing symptoms, cognition) in families characterized by high levels of maternal sensitivity (Bordeleau , Bernier, & Carrier, 2012) or low parental psychological control (El-Sheikh, Tu, Erath, & Buckhalt, 2014). For the present study, a low stress context would be descriptive of high family communication, whereas the high stress context would be descriptive of low family communication; greater sleep duration or lower sleep problems would be the protective attribute that would moderate the

association between family communication and depressive symptoms reported during college.

Both frameworks illustrate the potential for sleep to act as an important bioregulatory protective mechanism and the need for more research to examine whether it is a protective factor in low- or high- risk family environments. As such, the present research examined sleep as a moderator of associations between familism values and family communication in the prediction of depressive symptoms across the transition to college.

Although there are no previous studies that have directly tested these pathways, the review of previous research provides a framework for my hypotheses. For example, the association between low or high levels of parent communication during high school and reports of depressive symptoms before and after the transition into college may be weaker or stronger depending on the quality of sleep in high school. Youth who receive high quality sleep in high school yet experience poor family communication during high school may not see increases in depressive symptoms across the transition to college as compared to youth who obtain low quality sleep and have low communication with family who may see increases in depressive symptoms (dual risk perspective). A competing hypothesis is that the protective value of high quality sleep may only be present among youth who report high levels of family communication in high school, and thus moderate the association between high school reports of family communication with reports of depressive symptoms reported during college (protective-reactive pattern of effects).

The Current Study

Drawing from the integrative model (García Coll et al., 1996) and developmental systems theory (Ford & Lerner, 1992), the first aim of the present study was to explore associations between familism values and family communication with changes in depressive symptoms over the transition to college for Latino youth. To test this aim, total familism values and family communication were simultaneously included in statistical models to predict depressive symptoms in the first semester of college (see Figure 1). Based on work by Zeiders and colleagues (2013), the exploratory sub-aim was to examine each of the subscales of familism values (support, obligation, and referent) individually in the model with family communication. In addition to looking at how family communication and familism values predicted changes in depressive symptom from high school to college, the second aim was to examine whether sleep duration and sleep quality moderate these processes (Dahl & El-Sheikh, 2007). The strengths of this research design include multiple methods to assess sleep (e.g., objective actigraphy assessment, subjective self-report; Tremaine, Dorrian, &Blunden, 2010).

> *Hypothesis 1*: Low familism total values in high school would be associated with increases in depressive symptoms over the transition to college, while controlling for family communication. This hypothesis was based on prior research demonstrating similar associations between familism values and reports of depressive symptoms in Latino samples of adolescents and adults (Valdivieso-Mora et al., 2016).

Based on existing research (Zeiders et al., 2013), the following hypotheses about the subcomponents of familism were proposed:

Hypothesis 1a: Familism support values during high school would be negatively

associated with changes in depressive symptoms, while controlling for

family communication reported during high school.

Hypothesis 1b: Familism obligation values during high school would be

positively associated with depressive symptoms over the transition to

college, while controlling for family communication reported during high

school.

Hypothesis 1c: Familism referent values during high school would be

significantly associated with depressive symptoms over the transition to

college, while controlling for family communication reported during high

school.

Hypothesis 2: Lower levels of family communication during high school would

be associated with increases in depressive symptoms over the transition to

college, while controlling for familism values reported during high school.

Previous studies have reported negative relations between family communication

and depressive symptoms (Davidson & Cardemil, 2008; Martinez et al., 2015;

Noack, Kerr, & Olah, 1999), but have not examined this relationship among

Latino adolescents in particular, as proposed by the integrative model (García

Coll et al., 1996).

Hypothesis 3: Sleep duration measured objectively during high school would moderate the relation between familism values in high school and changes in depressive symptoms over the transition to college. Shorter sleep durations would serve as a vulnerability factor for youth such that associations between familism values and depressives symptoms would be stronger for youth experiencing low sleep duration as compared to youth with higher sleep duration. This hypothesis was based on previous research indicating that low familism values were associated with depressive symptoms among Latino adolescents (Calzada et al., 2012; Stein et al, 2015; Umana-Taylor et al., 2011). This hypothesis also drew from previous scholars indicating the need to explore biobehavioral mechanism of sleep within the family context (Dahl & El-Sheikh, 2007).

Hypothesis 4: Sleep duration would moderate similarly as a vulnerability factor in associations between family communication in high school and changes in depressive symptoms. This hypothesis drew on theoretical and empirical evidence that sleep is an important bioregulatory moderator of stress-well-being associations in children and adolescents (Dahl & El-Sheikh, 2007) and research that identified significant negative associations between family relationships and depressive symptoms among Latino adolescents (Smokowski, Rose, & Bacallo, 2010).

Based on recent calls in the literature to examine multiple indicators of sleep (Gregory & Sadeh, 2012; Tremaine, Dorrian, &Blunden, 2010) and in the interest of testing the

competing dual risk and protective-reactive perspective (Evans, 2003; Luthar et al., 2000; Sameroff, 1983), I hypothesized the following:

> *Hypothesis 5*: High school sleep problems would moderate the relation between familism values and changes in depressive symptoms over the transition to college. Adolescents who reported more sleep problems would have stronger negative associations between familism values and depressive symptoms, as compared to youth with few or low sleep problems reflecting the dual risk hypothesis (Evans, 2003; Sameroff, 1983).

> *Hypothesis 6*: High school sleep problems would moderate the relation between family communication and changes in depressive symptoms over the transition to college. Adolescents who reported more sleep problems would have stronger negative associations between family communication and depressive symptoms, as compared to youth with few or low sleep problems.

Methods

Participants

A total of 209 Latino(a) adolescents (35.6% male; M_{age}=17.59, SD=.53) were recruited during the spring of their senior year in high school as part of an ongoing multi-method longitudinal study of Latino adolescents transitioning to college. A total of 185 adolescents participated during the follow up study during their first semester of college (89% retention rate). Attrition analyses between T1 and T2 were conducted and reported in the results section. Recruitment strategies included university orientation sessions, email correspondence, text messages, and phone calls (in English and Spanish) from university

admissions data, university and community partnerships, and word of mouth. Bilingual staff were available to provide additional support and clarity of the study for the potential participants or caregivers. Inclusion criteria required that participants identified as Hispanic or Latino(a), paid an initial financial deposit or selected to defer payment to the university institution, were seniors in high school, and lived within 60 miles of the university during their senior year in high school. Participants came from 92 different high schools surrounding the metropolitan area.

Participants broadly self-identified as Hispanic or Latino; most participants identified as Mexican (84.7%) or South or Central American (10.1%), and others identified as bi-ethnic (18.2%; e.g., Latino and European American). The participants were from varying levels of socioeconomic status, as measured by their mother's and father's average level of education: 33.7% of parents completed some high school, 21.6% obtained a high school diploma or a GED, 22.8% had some college, 15.9% had a bachelor's degree, and 3.8% had a graduate degree. Participant generation status was calculated by participant report of their birthplace, parent's birthplaces, and grandparent's birthplaces (first generation 10.6%, second generation 62.0%, third generation 27.4 %).

Procedure

The university Institutional Review Board approved all procedures. All participants consented or assented (if under 18 and with consent from their primary caregiver) to the full study protocol at T1. All students agreed to participate for seven consecutive days for the first assessment. Typically, the participation started on Sunday evening and ended on the following Sunday morning. There were two home visits, the first occurred prior to the start of the participation week and the second was completed

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following the completion of the participation week. During the first home visit, before explaining the procedures for the week, the trained project staff members obtained a signed consent from the participants; parental consent was also collected during this time if the participants were under the age of 18. The consent form was prepared in English and Spanish in two separate forms. The forms were presented in the language that was preferred by the participant and their guardian. Participants were made aware of the voluntary nature of the study prior and during the explanation of the participation week.

After receiving consent, the researchers explained the procedure for the participation week; the adolescent participants and their parents were given multiple opportunities and encouraged to ask any questions regarding the study. During this time, the participants were instructed to wear an actiwatch during the 7 days of participation. Each of them were instructed to have the watch on their non-dominant wrist for the duration of the week, unless if they were planning on doing an activity that would submerge the watch underwater (i.e. showering, swimming). This procedure was encouraged to ensure that the participants did not forget to wear the watch during periods of sleep and were not misplacing them during the week if participation. Participants were sent feedback regarding their objective sleep throughout the study which was gathered from the actigraph watches. In addition to wearing the watch, participants also completed questionnaire assessments which included questions about familism values, family communication, and depressive symptoms; a total of 207 participants completed the online questionnaire. Prior to ending the first home visit, all of the participants were provided accessible contact information for study staff that they could use if they had any questions during the participation week regarding the procedure. Daily reminders were

sent to the participants via e-mail or text message to encourage complete and accurate participation of the study. After the week of participation, project staff members met with the participants, retrieved the study materials, and paid the participants up to $110 for their participation in the study.

Following the first wave of data collection which took place during the last semester or summer of the participants' high school senior year (December 2016-July 2017), the second wave of data collection began during the participants' first semester of college (September – December 2017). Participants were contacted via e-mail, text and phone to participate in a follow-up questionnaire assessment. Participants who completed the questionnaire were compensated $25 for their participation. One hundred eighty-five participants completed the T2 questionnaire (89% retention).

Measures

      Depressive symptoms. The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) is a 20-item, self-report assessment of depressive symptoms that has been validated across a broader range of communities within the U.S. (Dam & Earleywine, 2010), and specifically among communities of color (Boey, 1999; Campo-Arias et al., 2007; Mahard, 1988). The purpose of this scale is to measure how often the participants experienced depressive symptoms during the week prior to completing the scale. Each of the items are answered on a Likert scale of 0 (*rarely or none of the time*) to 3 (*most or all of the time*). Scores range from 0 to 60, a higher value indicates presence of more depressive symptomatology, and a cutoff score of 16 indicates clinical levels of depressive symptoms (Radloff, 1977). Examples of negative affect items include, "I felt depressed", "I thought my life had been a failure", and I felt sad". Examples of positive

affect items are, "I felt like I was just as good as other people" and "I was happy". The four positive affect items were reverse coded. Examples of somatic complaint items are, "I had crying spells", "I felt fearful", and "I felt that I was too tired to do things". Lastly, the interpersonal relations items are, "People were unfriendly to me" and "I felt that people disliked me". Compared to other scales that measure depressive symptomology, the CES-D is a particularly robust assessment that measures a continuum from well-being to depression (Siddway, Wood, & Taylor, 2017). The internal consistency of the CES-D in this sample was Cronbach's $\alpha = .96$ at T1 and $\alpha = .94$ at T2.

Familism values. Participants responded to 16 items from the Mexican American Cultural Value Scale (MACVS; Knight, Gonzales, Saenz, Bonds, German, Deardorff, Roosa, & Upderaff, 2010) that focused on the family: support (6-items; $\alpha = .83$), obligation (5-items; $\alpha = .79$), and referent (5-items; $\alpha = .72$). For analysis, subscales were individually evaluated and also combined to one overall Familism score ($\alpha = .91$). The responses to the questions were completed on a Likert scale ranging from 1 (*not at all*) to 5 (*completely*). Examples items include: "It is always important to be united as a family" (familism-support); "Older kids should take care of and be role models for their younger brothers and sisters" (familism-obligation); "It is important to work hard and do one's best because this work reflects on the family" (familism-referent). The MACVS has demonstrated adequate construct validity among Mexican-origin adolescents and parents (Knight et al., 2010), and the scale has been used with other Latino groups who share a cultural heritage (Corona et al., 2017).

Family communication. The Family Communication Scale (FCS) measures how often family members share information, ideas, thoughts, and feelings with each other

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(Barnes & Olson, 2004). This 10-item scale was adapted from the longer Parent-

Adolescent Communication Scale (PAC) to shorten the length of the scale and capture

communication broadly across the family. The responses to the questions were completed

on a Likert scale ranging from 1 (*strongly disagree*) to5 (*strongly agree*). Scores can

range from 10 – 50. There are five interpretations of these scores: very low (10-29), low

(30-35), moderate (36-39), high (40-43), very high (44-50; Barnes & Olson, 2004).

Cronbach's alpha in this sample was α=.86. Higher reports of satisfaction of family

communication measured through the FCS was significantly associated with reduced risk

of externalizing behaviors among a sample of immigrant children from different

Caribbean countries, while a low score of family communication predicted poorer family

functioning, as well as more psychological and academic difficulties (Howell-Whittaker,

2012). Previous studies have utilized the Parent-Adolescent Communication Scale to

predict externalizing or risk-taking behavior among Latino adolescents (Cordova et al.,

2016; O'Sullivan et al., 1999).

Sleep problems. The Pittsburgh Sleep Quality Index (PSQI) is used to measure

the quality and patterns of sleep (Buysee, Reynolds III, Monk, Berman, & Kupfer, 1989).

Subjective quality of sleep is measured in the PSQI by seven subscales: subjective sleep

quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of

sleeping medications, and daytime dysfunction (Buysee et al., 1989). The participants

completed the 19-item self-report questionnaire recalling their usual sleep behavior from

the prior month. Participants were asked to record their responses to open-ended

questions such as, "During the past month, how many hours of actual sleep did you get at

night?" to determine sleep duration. Participants also answered four-point Likert scale

questions like "During the past month, how often have you had trouble sleeping because you have to use the bathroom?" Responses to these questions were coded from 0 (*not during the past month*), to 3 (*three or more times in a week*). These values were then summed to report subscale scores or the overall global PSQI score. The possible scoring ranged from 0 - 21, with higher scores indicating poorer sleep quality and more sleep disturbances; a score of 5 or greater indicates clinically significant sleep problems (PSQI; Buysee et al., 1989).

Psychometric evaluation of PSQI concluded that PSQI scores were highly correlated with measures of sleep quality and sleep problems (Carpenter & Andrykowski, 1998); there was a significant group difference between individuals with sleep problems compared to individuals without such problems. Tomfohr et al. (2013) also evaluated the psychometric characteristics of the PSQI in English speaking non-Latino White participants and English and Spanish-speaking Latino participants and found that the inventory was valid across the groups. Previous research suggests that such subjective measures of sleep may explain different facets of sleep and well-being than objective sleep measures (Tremaine, Dorrian, & Blunden, 2010).

Objective Sleep. Participants wore a Micro Motion Logger Watch (Ambulatory Monitoring, Inc. Ardsley, NY USA) on their non-dominant wrist during T1 for 7 days. These devices were set to run in zero-crossing mode with a data storage epoch length of 60 seconds. This actiwatch contains an accelerometer, which captures movement throughout the waking day and during sleep periods. It also has a built-in "event button" which the participant pressed prior to going to bed at night and upon waking.

Collection of reliable objective sleep data for adolescents living at home on self-selected sleep-wake schedules may be challenging due to reasons such as illness, technical difficulties, and participant noncompliance. Therefore, the present study followed the guidelines suggested by Acebo and her colleagues (1999) to record at least 1 full week of actigraphy data, aiming to collect at least 5 nights of analyzable data to obtain reliable measures of sleep. Previous studies have validated data collected through the actigraphy against polysomnography (Hyde, O'Driscoll, Binete, Galang, Tan, Verginis, Davey, & Home, 2007; Sadeh, Sharkey, & Carskadon, 1994). Once the data was retrieved from the watches, the sleep data were scored using the Sadeh algorithm (Sadeh, Hauri, Kripke, & Lavie, 1995; Sadeh et al., 1994) in Action W-2 software version 2.7.1 (Ambulatory Monitoring) program.

Objective measurement of sleep periods was cross-referenced with diary self-reports of sleep and wake times for indications of outliers or equipment malfunction. There was one equipment malfunction where the battery of the watch was exhausted. The lab delivered a new watch to the participant and later linked the data with said participant. Missing data was mostly due to participants not wearing the watch. In total, 76% (n = 151) wore the actigraph for 7 nights, 14% (n = 30) had data for 6 nights, 5% (n = 12) had data for 5 nights, 2% (n = 3) had data for 4 nights, and 2% (n = 3) had data for 3 or fewer nights of sleep. If data consist of fewer than 3 nights of actigraphy data, then they provide poor estimation of regular sleep (Acebo et al., 1999). Separate analyses were conducted excluding cases with fewer than five nights of sleep (n = 9) to examine if results are consistent. I will focus on sleep duration for the present study. Sleep duration was the total number of minutes scored as sleep over the sleep period which is the time between

actigraphy-detected sleep onset and wake time; the sleep and wake times were cross confirmed by researchers in the lab with diary data to examine outliers. Consistent with adolescent sleep research (Bagley, Tu, Buckhalt, & El-Sheikh, 2016), values greater than three *SD*s above or below the mean were considered outliers and winsorized to avoid biasing result (0.3% of sleep duration data).

      Covariates. I explored several different covariates that previous research has identified as significant correlates or predictors of depressive symptoms in samples of Latino adolescents (Martin-Gutierrez et al., 2017). Potential covariates included gender (1=male) and immigrant generation score (from 0 = *participant, both parents, and both sets of grandparents born outside U.S.* to 7 = *participant, parents, and both sets of grandparents born in U.S.*; Umaña-Taylor, Alfaro, Bámaca, & Guimond, 2009). Parent education level as a proxy for socioeconomic status (mean of mother's and father's highest education level; form 1 = less than high school to 10 = doctorate or advanced degree). Since T1 extended into the summer prior to college entry, summer variable was inserted into the model as a covariate (1 = study completed during last semester of high school, 0 = study completed during the summer prior to college entry).

Analytic Plan

      Preliminary analyses. Descriptive statistics were reviewed for all study variables, including means, ranges, standard deviations, and estimates of skewness and kurtosis for both T1 and T2. Data were represented graphically in SPSS to examine normality of variable distributions. Together, descriptive statistics and visual inspection of the data aided in the identification of outlier cases that may have undue influence on the trends of the data. Extreme values were investigated further by using all available

information. A paired sample *t*-test was conducted to examine if there was a significant change between depressive symptoms scores reported at T1 and T2. Attrition analyses on demographic information were conducted across various study variables to examine if there were significant differences between youth who participated at both time points compared to youth who only participated in the first assessment ($n = 209$ at T1, $n = 185$ at T2). After decisions were made whether to include outlier cases, bivariate zero-order correlations were used to examine relations between familism values, family communication, subjective and objective sleep and depressive symptoms. I further examined bivariate correlations between covariates and the independent and dependent variables of interest.

Aim 1 and 2 analyses. To handle missing data, primary analyses were conducted in Mplus 7.4 (Muthén & Muthén, 1998-2012) using full information maximum likelihood (FIML). All independent predictors, moderators and covariates were grand-mean centered. To test my first hypothesis, I conducted several analyses using OLS regression; standardized estimates, standard error, and significance values were reported. Model fit statistics were also examined and reported. Familism values and family communication were used as independent variables within the same regression model to predict the change of depressive symptoms from high school to college. In this investigation, I predicted the change of depressive symptom scores from high school to college by utilizing the cross lagged estimation method (Cohen, Cohen, West, & Aiken, 2015, p. 572) which is to control for depressive symptom scores reported in high school within the regression model, rather than utilizing the difference of depressive symptom scores from high school to college. Using OLS, I regressed college depressive symptoms on familism

values, family communication, depressive symptom score from high school, and covariates. Then to test the sub-aims of hypothesis one, I regressed college depressive symptoms on each of the subcategories of familism (i.e., familism-referent, familism-support, and familism-obligation) in separate models; each of these regression models had family communication, high school depressive symptom scores, and covariates.

Aim 3 analyses. The third aim was to test the moderating role of sleep duration across the different regression models previously listed in the first and second aims. First, to test hypothesis three, depressive symptoms reported in college was regressed on total familism values, sleep duration, high school depressive symptoms, family communication, covariates, and the interaction between familism values and sleep duration. To examine how sleep duration and the interaction term contributes to the model, a second model fit statistics were examined and reported. Second, to test hypothesis four, depressive symptoms reported in college was regressed on total family communication, sleep duration, high school depressive symptoms, familism values, covariates, and the interaction between familism values and sleep duration. Significant interactions were probed using simple slopes techniques (Preacher, Curran, & Bauer, 2006).

Aim 4 analyses. The fourth aim was to test the moderating role of sleep problems across the different regression models previously listed in the first and second aims. First, to test hypothesis five, depressive symptoms reported in college was regressed on total familism values, sleep problems, high school depressive symptoms, family communication, covariates, and the interaction between familism values and sleep problems. To examine how sleep problems and the interaction term contributed to the

model, a third model fit statistics were examined and reported. Second, to test hypothesis six, depressive symptoms reported in college was regressed by total family communication, sleep problems, high school depressive symptom report, familism values, covariates, and the interaction between total family communication and sleep problems. Significant interactions were probed using simple slopes techniques (Preacher, Curran, & Bauer, 2006).

Results

Descriptive Data

Descriptive statistics (means, standard deviations, percentages) were assessed for all variables and can be found in Table 1. The sample broadly identified as Hispanic or Latino; most participants specifically identified as being of Mexican (85.1%), South or Central American (8.7%), Cuban (5.3%), or other (4.3%) descent, and 18.2% identified as bi-ethnic (e.g., Latino(a) and European American; see Table 1). Participants showed a wide range of generational status: 10.6% were first-generation immigrants (born outside the U.S.), 62% were second generation (born in U.S., at least one parent born outside the U.S.), and 27.4% were third generation or greater (Table 1). Participants came from diverse socioeconomic backgrounds as indicated by their parents' average level of education: 33.7% of the parents in the sample completed some or less than high school, 21.6% received a high school diploma or equivalent, 22.8% had some college, 15.9% percent completed a Bachelor's degree, and 3.8% had a graduate degree. Average age of the participants were 17.59 (SD= .53) with 36% male participants.

The overall average reports of depressive symptoms measured at T1 was 16.36 (SD = 10.22) and increased to 18.52 (SD = 10.43) at T2. The clinical cut-off scores

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determined for subjective reports of depressive symptom (CES-D) are normal (scores 0 -

16), mild (scores 16 – 22), and moderate to severe (scores 23 or higher; Roberts et al.,

1990). In total at T1, 58.3% of adolescents met criteria for normal, 17% for mild, and

24.7% for moderate to severe depressive symptoms. At T2, 49.5% of adolescents met

criteria for normal, 19.5% for mild, and 31% for moderate to severe depressive

symptoms. A dependent *t*-test revealed that there was a significant difference between T1

and T2 reports of depressive symptoms *t* (173) = 2.59, *p* = .01.

On average, participants slept 6.58 (*SD*=.95) hours per night when the

recommended hours of sleep for teenagers range between 8 to 10 hours of sleep. Average

subjective sleep quality, measured via the PSQI, was 6.63 (*SD*=.77). PSQI scores above 5

are considered to be indicative of poor sleep quality (Buysse et al.,1989; Buysse et al.,

2008); a total of 61.2% scored above 5 at T1. Latino adolescents reported, on average,

3.41 on perceived quality of family communication (*SD*= .77). The average report of

familism values varied on the subcomponents (support *M* = 3.95, *SD* = .76; obligation *M*

= 3.84, *SD* = .70; referent *M* = 3.45 *SD* = .82); familism total values were on average 3.76

(*SD* = .69).

Attrition Analysis

First, an attrition analysis was conducted using *t*-tests to examine if the sample

demographic information changed from T1 to T2 due to attrition (*n* = 209 at T1, *n* = 185

at T2). Immigrant generation from T1 to T2 did not significantly differ (*t* (206) = .03, *p*

= .97). Overall parent education form T1 to T2 did not differ through attrition (*t* (206)

= .40, *p* = .69). Differences of sex among study participants at T1 and T2 did not change

(*t* (206) = -1.3, *p* = .20). In addition to comparing the means of the demographic variables

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from T1 to T2, another set of *t*-tests were conducted to examine if there were significant mean differences between study variables among participants who participated at only T1 versus at both T1 and T2. The *t*-test revealed no significant differences in means between the groups for family communication (t (200) = 1.53, p = .13), familism-referent (t (204) = 1.83, p = .07), familism-obligation (t (204) = 1.64, p = .10), sleep duration (t (197) = -.36, p = .72), and depressive symptoms during high school (t (203) = -1.38, p = .17). However, there were significant group differences between familism-total (t (204) = 2.01, p = .04), familism-support (t (204) = 2.17, p = .03), and sleep problems (t (203) = -2.27, p = .02); participants who did not participate during T2 reported greater familism-total and familism-support, but lower mean of sleep problems at T1.

Next, χ^2 tests were conducted to examine if there were significant differences between participant demographics among those who only participated during high school versus those who participated at both time points. The percentage of participants that participated in both time points did not differ by gender (χ^2 (1) = 1.69, p < .19), immigrant generation (χ^2(7) = 13.63, p < .06), parent education (χ^2 (17) = 20.35, p < .26), and summer participation (χ^2 (1) = .42, p < .52).

Bivariate Correlations

Bivariate correlations were assessed for all variables and can be found in Table 2. Among dependent, independent, and control variables, there were several statistically significant bivariate correlations. Family communication (r = -.36, p < .01), sleep problems (r = .28, p < .01), depressive symptoms at T1 (r = .49, p < .01), and being male (r = -.20, p < .05) were significantly associated with depressive symptoms at T2.

Aims 1 and 2: Regression analyses for familism and family communication

A series of linear regression analyses were estimated to examine the main effects of familism (e.g., familism -total, -support, -obligation, -referent) and family communication on adolescent depressive symptoms reported during the first semester of college (Table 3). Per Aiken and West (1991), all models controlled for parent education, immigration generation, summer participation, and sex. High school report of depressive symptoms was also controlled per cross-lagged estimation method (Cohen, Cohen, West, & Aiken, 2015, p. 572).

Controlling for depressive symptoms reported during high school, parent education, immigration generation, summer participation, and sex, the main effects model 1 with familism total and family communication explained 34% of the variance; there was a good model fit, χ^2 (7) = 64.43, $p < .001$, CFI = 1.00, RMSEA = 0.00 and SRMR = 0.00. Family communication was significantly associated with fewer Latino adolescent depressive symptoms (β = -.23 {CI, -5.06, -1.12}, $p < .001$), but familism total was not significantly associated with college depressive symptoms (β = .06, p = .34). When examining the subscales of familism in subsequent models, familism-–support, –obligation, and –referent while holding other variables constant, none of the familism subscales were significant predictors of college depressive symptoms (*support*: β = .02, p = .75; *obligation*: β = .07, p = .27; *referent*: β = .09, p = .21).

Aims 3: Moderation analyses for sleep duration

After estimating the main effects, interaction terms were entered into the model (Table 4). Model 1 had familism-total, family communication, sleep duration, the interaction between familism-total and sleep duration, depressive symptoms at T1, and covariates. With the addition of sleep duration and the interaction term, the model

explained 35% of the variance. There was a good model fit, χ^2 (9) = 66.91, $p < .001$, CFI

= 1.00, RMSEA = 0.00 and SRMR = 0.00.

Sleep duration did not significantly moderate the associations between familism

values and college depressive symptoms (familism total x sleep duration: $\beta = .00$, $p = .98$;

familism support x sleep duration: $\beta = .00$, $p = .99$; familism obligation x sleep duration:

$\beta = .02$, $p = .72$; familism referent x sleep duration: $\beta = .00$, $p = .99$). Sleep duration also

did not significantly moderate the association between and family communication and

college depressive symptoms ($\beta = -.01$, $p = .94$). Family communication continued to

have a negative main effect on college depressive symptoms across all models even after

the inclusion of the interaction term. Immigrant generation was significantly associated

with college depressive symptoms in all models with similar standard estimates and

significance (*total:* $\beta = .15$, $p = .03$; Table 4).

Aims 4: Moderating role of sleep problems

Results from models examining the moderating role sleep problems on familism

and family communication with college depressive outcomes were similar to the results

reported above for sleep duration (Table 5). Model 1 had familism-total, family

communication, sleep problems, interaction between familism-total and sleep problems,

depressive symptoms at T1, and covariates. With the addition of sleep problems and the

interaction term, the model explained 36% of the variance. There was a good model fit, χ^2

(9) = 67.5, $p < .001$, CFI = 1.00, RMSEA = 0.00 and SRMR = 0.00. Models 2 – 4 had the

subcomponents of familism values, similar to the model sequence presented for the

analyses of sleep duration. Model 5 had family communication, familism-total, sleep

problems, interaction between family communication and sleep problems, depressive symptoms at T1, and covariates.

Sleep problems did not significantly moderate associations between familism – total, -obligation, and -referent values with college depressive symptoms (familism total x sleep problems: $\beta = .11$, $p = .11$; familism obligation x sleep problems: $\beta = .07$, $p = .28$; familism referent x sleep problems: $\beta = .08$, $p = .25$). Sleep problems significantly moderated the associations between familism support values with college depressive symptoms ($\beta = .14$ {CI, .06, 1.12}, $p = .03$). However, upon further simple slope analyses there were no significant associations between familism support and college depressive symptoms at high ($\beta = .28$, $p = .14$), average ($\beta = -.01$, $p = .93$), and low ($\beta = -.30$, $p = .20$) level of sleep problems.

Sleep problems did not significantly moderate the associations between family communication with college depressive symptoms ($\beta = .01$, $p = .88$). Family communication continued to have a negative main effect on college depressive symptoms across all models even after the inclusion of the interaction variable. Immigrant generation was significantly associated with college depressive symptoms in all models with similar estimates and significance (model with *total; immigrant generation: $\beta = .13$, $p = .05$*; model with *family communication; immigrant generation*: $\beta = .15$, $p = .03$; Table 5).

Discussion

The percentage of Latino youth who enrolled in degree-granting postsecondary institutions increased from 4 to 17 percent from 1976 to 2015, yet they continue to be the ethnic minority group least likely to graduate with a Bachelor's degree (NCES, 2015).

Given links between mental health and academic performance among diverse samples (Eisenberg, Golberstein, & Hunt, 2009) and evidence that Latino youth report greater psychological distress, suicidal ideation, anxiety, and depression than their Euro American peers (Anderson & Mayes, 2010; Hwang & Goto, 2009; Polo & Lopez, 2009; Wight et al., 2005; Zahn-Waxler, Shirtcliff, & Marceau, 2008), this study aimed to examine whether important qualities of the family predicted changes in depressive symptoms across the transition to college. Accumulating research has identified the role of family as an integral part of Latino youth development, with previous research demonstrating familism values as both protective and promotive in Latino youth adjustment and well-being (Cupito et al., 2016; Smokowski et al., 2010; Stein et al., 2013). Yet, few studies have examined family-related cultural values (e.g., familism) and perceptions of family behaviors (e.g., family communication) simultaneously. The purpose of this study was to consider how high school family dynamics (e.g., family communication) and cultural values (e.g., familism) predicted Latino adolescents' depressive symptoms during their first semester in college. I found that greater family communication quality was associated with lower reports of depressive symptoms in college, while there were no associations between familism values and depressive symptoms in college.

An additional goal of the study was to examine whether sleep duration or sleep problems in high school moderated associations between family communication and familism values with depressive symptoms in college. Sleep has been hypothesized to serve as a restorative biological mechanism during adolescence (Dahl & Lewin, 2002) with recent studies highlighting sleep as a potential moderator that could amplify or

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reduce the effects of familial risk on youths' adjustment problems (Shochat et al., 2014).

I did not identify any moderating patterns of sleep duration or sleep problems in high

school on the associations between family communication or familism values in high

school and changes in depressive symptoms across the transition to college. Importantly,

I did identify that immigrant generation was positively associated with depressive

symptoms in college, which supports some work with Latino adults and adolescents

illustrating the immigrant paradox (Marks & García Coll, 2012; Tummala-Narra &

Claudius, 2013).

Depressive Symptoms during Transition from High School to College

A great deal of previous research suggests that Latino youth report greater

depressive symptoms as compared to all other ethnic groups (Anderson & Mayes, 2010;

Brown, Meadows, & Elder, 2007; Hwang & Goto, 2009; Polo & Lopez, 2009; Wight et

al, 2005; Zahn-Waxler et al., 2008). For example, a nationally representative,

heterogeneous sample of adolescents (n=13,568; National Longitudinal Study of

Adolescent Health) found that across all racial/ethnic groups about 9% of adolescents

reported moderate to severe depressive symptoms (Rushton, Forcier, & Schectman,

2002). Using a subset of the National Longitudinal Study of Adolescent Health ($n =$

10,691), Crockett and colleagues (2005) found that 35.6% of Latino American youths

met the cutoff for clinical levels of depressive symptoms. In comparison to these studies,

the present sample of Latino adolescents reported 17% for mild and 24.7% for moderate

to severe depressive symptoms during high school and 19.5% for mild and 31% for

moderate to severe depressive symptoms during first semester of college. As such, my

findings are consistent with previous national estimates given that the Latino youth in this

sample reported higher rates of both moderate and severe depressive symptoms. Of note is that I also identified a significant increase in depressive symptoms from high school to college. Given that depressive symptoms in college have been associated with poor grades and dropping out of college (Eisenberg, Golberstein, & Hunt, 2009), these findings suggest the need for continued examination of protective and promotive factors that can assist Latino youth's transition from high school to college.

Family Communication

Upon examination of the variables of interest and covariates, family communication and immigrant generation were the only significant predictors of depressive symptoms in college after adjusting for high school levels. Specifically, worse family communication in high school was associated with greater reports of depressive symptoms in college, while controlling for depressive symptoms reported in high school. There is limited research on how family quality and family dynamics are associated with depressive symptoms among Latino adolescents. One study that examined associations between family-related behaviors (e.g., time spent with family, maternal and paternal acceptance) and depressive symptoms among Mexican-origin families found that greater family time during late-adolescence was associated with decreases in youth depressive symptoms during youth adulthood among youth who simultaneously reported high levels of parental acceptance (Zeiders, Updegraff, Umaña-Taylor, McHale, & Padilla, 2015). To my knowledge, family communication has not been used as a variable of interest in the prediction of depressive symptoms in other studies of Latino adolescents.

Family communication in this study was a measure of adolescents' perception of how well their family communicated with each other regarding problems, ideas/beliefs,

and feelings. In addition, adolescents rated their family members' communication qualities (e.g., good listener, mindful of other's wants, honesty). Importantly, the scale did not ask of the quantity of family communication. Previous research has shown that family members continue to play a significant role by providing the appropriate amount of respect, support, and closeness even while adolescents are developing more independent, adult-like autonomy and decision-making (Davidson & Cardemil, 2008; Meeus et al., 2005; Ruck, Abramovitch, & Keating, 1998). In line with previous research and theory, I found that as Latino adolescents are preparing to transition from high school to college, greater positive family communication in regards to their goals, ideas, and thoughts contributed to a lower reports of depressive symptoms in college. Potential underlying mechanisms might be the secure attachment that previous studies have found healthy developmental outcomes for the adolescent (Moretti & Peled, 2004). Extending our current literature, it is important to note that Latino families look different across household (e.g., multigenerational households, siblings). Future studies should examine how secure family attachments to different members of the family (e.g., siblings, grandparents, extended families) may differently promote Latino adolescent outcomes.

Familism Values

Contrary to the hypotheses and existing literature, there were no significant associations between familism values and depressive symptoms in college. Recent meta-analysis indicated a small effect size ($d = .21$) for the 24 studies of depressive symptoms in Latino youth and adults and a small effect size ($d = .33$) for the 12 studies on familism and internalizing symptoms broadly (Valdivieso-Mora, Peet, Garnier, Salazar, & Johnson, 2016). However, the range of effect sizes for both outcomes were ranged from

non-significant and moderate. Among these studies, those that utilized the Attitudinal Familism Scale (Lugo, Steidel, & Contreras, 2013) and a different measure of depressive symptoms and internalizing symptoms (e.g., Youth Self Report; Achenbach, 1991) were more likely to identify the moderate effect size (Valdivieso-Mora et al., 2016). Upon examining the studies that utilized the same measurement of familism values (e.g., MACVS) and depressive symptoms (e.g., CES-D), these studies reported small effect sizes (Cohen's *d* range of .08 - .17). Studies that examined subcomponents of familism values, as I did in this study, were also among the group that reported smaller effect sizes (Campos et al, 2014; Zeiders et al., 2013). Considering these factors, the present study's findings are more closely reflective of the existing literature.

The findings of the present study may differ from existing research due to the selected study design examining a period of late-adolescence among a group of college-going Latino adolescents. Many studies that found significant associations between familism and depressive symptoms examined early- to mid- adolescence as opposed to late adolescence (e.g. Baumann et al., 2010; Smokowski et al., 2009). Broadly, the adolescent period encompasses numerous contexts and developmental processes (e.g., middle school versus high school, brain development, puberty) such that differing associations may also be due to underlying pubertal or contextual influences. For example, research has identified that depressive symptoms peak at the age of 15-16 in cross-national and diverse samples of adolescent girls (Wade, Cairney, & Pevalin, 2002). Further, significant mean-level changes in Mexican-origin adolescents' cultural orientations have been identified from early to late adolescence (e.g., declines in familism values and involvement in Mexican culture; Updegraff et al., 2012). In addition, per the

inclusion criterion, all participants of the study accepted an offer from a four-year university during their senior year in high school. Although participants came from over 90 different high schools, the sample may differ from other community-based samples that select into diverse trajectories after high school (i.e., community college, work, out-of-state university). As such, the sample represents a subset of Latino adolescents within a unique academic context.

Importantly, my findings contribute to existing literature by identifying a difference in the predictive value of family-related cultural values versus family behaviors. Conceptually, these variables may influence one another (e.g., honoring family and caring for gaining parents is a product of cultural values and traditions; Schwartz et al., 2010). Interestingly, in this study, family communication was significantly correlated with familism values ($r = .25$, p < .001; Table 2), but my findings exemplify how each may influence adolescents' internalizing symptoms differently. Although both the family communication and familism-support values measures have questions or subscales intended to capture family support, family communication seems to be a proximal process that is associated Latino adolescents' internalizing symptoms for the reasons described in the previous section on family communication. Future research should seek to examine whether cultural values moderate associations between proximal cultural behaviors and developmental outcomes for Latino adolescents as they transition and adjust to the university context.

Immigrant Generation

I also identified that immigrant generation score was positively associated with depressive symptoms in college. Specifically, Latino adolescents with fewer relatives

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(i.e., parents, grandparents) who had been born in the United States had lower levels of depressive symptoms in college as compared to adolescents in the sample who were of later generation status. This is consistent with both theory and research supporting the *immigrant paradox*, or the tendency to see worse developmental outcomes (i.e., physical health or weight, mental health, rates of disease, academic achievement) among immigrant individuals of later generations or those who endorse higher levels of acculturation (Alegría et al., 2008; García Coll et al., 2012; Teruya & Bazargan-Hejazi, 2013). The immigrant paradox has been identified across a broad range of developmental outcomes in Latino populations (e.g., academic outcomes, risk behaviors, self-esteem; Breslau, 2011; Smokowski, 2010; Suárez-Orozco et al., 2009). Interestingly, among these developmental outcomes, the existing empirical support for the existence of the immigrant paradox for internalizing symptoms and depressive symptoms in Latino adolescents is less consistent. While some studies have indicated that first-generation immigrants report higher internalizing symptoms and feeling of alienation (Yu et al., 2003), other research has reported fewer depressive symptoms among first-generation Latinos than later generation peers (Farley, Galves, Dickinson, & Perez, 2005; Harker, 2001; Harris, 1999).

It is possible that the mixed findings regarding depressive symptoms are heavily dependent on context (García Coll et al., 2012). For example, a sample of first-generation Latino immigrant youth reported that time in the United States and support from family and teachers reduced the risk of depressive symptoms and anxiety (Potochnick & Perreira, 2010). Without taking into consideration of immigrant experiences (e.g., time in the United States, age of immigration, income, immigrant legal status), the literature on

immigration generation and internalizing symptoms will remain inconsistent (Teruya &

Bazargan-Hejazi, 2013). With context in mind, our method of recruitment (e.g., all

students who were accepted and enrolled into college) may have contributed to the

positive association between immigrant generation and depressive symptoms. Future

research will need to examine whether immigrant generation status is an important

moderator of associations between depressive symptoms and academic outcomes or

persistence in college to understand whether some Latino youth are more at risk for lower

achievement or engagement in higher education.

Moderating Role of Sleep as Biological Mechanisms

The third and fourth aims of the study were to examine the moderating role of

sleep problems and sleep duration on the associations between family communication or

familism values and depressive symptoms. Sleep duration and sleep problems did not

moderate the association between familism values and depressive symptoms; these

biobehavioral mechanisms also did not moderate the association between family

communication and depressive symptoms. While recent research has highlighted the

importance of understanding how sleep processes are integrated in the family

environment (e.g., poor parent-youth relationships predicting poor sleep quality in Latino

youth, Kuo et al., 2014), emerging evidence suggests that sleep may also be a moderating

regulatory mechanism in daily life that promotes well-being (Dahl & El-Sheikh, 2007).

Further, clinical research in adult populations has identified sleep to be an important

protective factor in psychiatric disorders (e.g., depression and bipolar disorder; Saper,

Scammell, & Lu, 2005). The study aims were developed with the idea that poor sleep

might attenuate positive associations between family communication and familism values

with depressive symptoms or that good sleep might buffer associations between lower family communication or familism values and depressive symptoms.

There may be several reasons that I did not identify sleep as an important moderator of associations between familism values or family communication and depressive symptoms. The complex interaction between sleep and family functioning that has been identified in childhood (e.g., Adam, Snell, & Pendry, 2007; Fiese et al., 2007; Milan, Snow, &Belay, 2007) may not reflect experiences of late adolescents who likely have more autonomy in setting their own sleep schedules. An exception is work by Lemola and colleagues (2012) who found that large weekday to weekend sleep duration difference (e.g., short sleep duration on weekdays and long sleep duration on weekends) moderated the association between interparental conflict and adolescents' conflict and adolescents' aggression (M_{age} = 11.6). Future research should examined the timing of sleep and sleep schedules as potential moderators of family processes and adolescent outcomes.

Further, sleep may moderate developmental processes differently in adolescence as compared to childhood due to changes in norms of parental involvement and adolescent autonomy. For example, early adolescents may have different relationships with their family than adolescents who are preparing to graduate from high school. Older adolescents tend to have greater autonomy, more responsibilities (e.g., academics, jobs, social life, and family life; Arnett, 2000; Meeus et al., 2005). These differences in family dynamics may contribute to the different attenuating roles of sleep problems and sleep durations.

Lastly, sleep may be a more immediate, proximal process. The present study examined how sleep problems and sleep duration during the senior year of high school moderated the association between family variables and depressive symptoms reported in college. Sleep may have a short-term, immediate influence on daily functioning and may be more likely to moderate concurrent rather than prospective depressive symptoms. For example, sleep duration and sleep problems changed over the transition to college (see Doane, Gress-Smith & Breitenstein, 2014) such that we might hypothesize that concurrent sleep might exacerbate or attenuate existing associations between familism values or family communication quality and depressive symptoms). Future research will need to examine whether concurrent sleep quality and sleep duration moderates the associations between family contexts and depressive symptoms among late-adolescents. Future considerations while studying sleep is to be mindful of sleep process (e.g., prospective, concurrent, extended/continued disruptions of sleep), developmental period (e.g., transition period, middle school, summer), and sleep parameter examined (e.g., variability, duration, problems, quality).

Guided by the integrative model (García Coll et al., 1996) and developmental systems theory (Ford & Lerner, 1992), this study focused on understanding Latino adolescent development over the transition to college by examining multilevel factors that affect developmental processes at the community (e.g., familism values), family (e.g., family communication), and individual (e.g., sleep problems, sleep quality) level. In addition to examining these specific levels, this study examined such processes in a homogenous sample of Latino adolescents to aim at understanding proximal cultural processes within culture groups rather than relying on cross ethnic comparisons which

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can lead to deficit interpretations of development. Following the integrative model (García Coll et al., 1996), this study identified promotive contextual factors for Latino adolescents including family communication and immigrant generation, particularly as they transition into a new sociocontextual environment, college.

Limitations and Future Directions

A notable limitation of this study is the short period between the high school and college data collection time points (*M* time between assessment points: 177 days). Despite this study window, Latino adolescent participants reported a significant increase in depressive symptoms from high school to college. Although this approach provided an insight into the short window of the Latino adolescents' experiences immediately before and after their transition from high school to college, it is possible that an evaluation of depressive symptoms over a longer period of time along with changes in family communication or familism values might elucidate different findings. Future studies should consider adding later follow up assessments of depressive symptoms during their sophomore and junior year of college, in addition to their reports from the first year. This information would provide greater understanding of the developmental trajectories of depressive symptoms in Latino adolescents during their transition into and adaptation to college.

Another limitation of the study is that the sample of Latino adolescents were accepted into a four-year bachelor's granting institution within 60 miles of their home prior to participating in the study. As such, the present sample of Latino adolescents are not representative of larger community samples of Latino adolescent peers, many of whom attend community college after high school or do not attend college (National

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Center for Education Statistics, 2016). However, the sample was representative of the heterogeneous body of incoming freshman in terms of both socioeconomic status as well as perceived social class.

Additional study limitations include having a single reporter (i.e., no parent or sibling report of family communication and family values). Importantly, the reliance on self-report may miss potential the bidirectional associations between family relationships and *inter-* and *intra-* generational exchanges of cultural values. Parent and sibling's reports of family communication and familism values may provide different point of view of the family dynamics. Congruity as opposed to incongruity of these reports from family members may have differing influences on depressive symptoms in college and adolescent development broadly (Parent et al., 2014).

Conclusion

In conclusion, this study examined different components of family dynamics (e.g., family communication, familism values) to predict Latino adolescents' reports of depressive symptoms during their first semester of college, while controlling for their reports of depressive symptoms in high school. I also investigated whether sleep duration and sleep quality would moderate the association between the family dynamic variables with depressive symptoms. Findings suggest that adolescent perceptions of positive family communication in high school may promote more positive psychological experiences during the transition process from high school to college. The study did not find associations between familism values and depressive symptoms in college or that sleep was a moderator of the identified patterns. Drawing from the integrative model (García Coll et al., 1996) and using an ethnic homogenous design, the study illustrated

one potential promotive factor that can be targeted in high school seniors to promote

positive mental health outcomes in Latino adolescents as they transition into a four-year

university.

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Table 1

Summary of Demographic Information and Study Variable Descriptive Statistics

Demographic Summary	T1		T2	
	n	%	*n*	%
[a]Family national origin				
Mexican	177	85.1%	157	84.9%
South or Central American	18	8.7%	16	8.6%
Cuban	11	5.3%	10	5.4%
Other	9	4.3%	9	4.8%
Parent education level				
Some or less than high school	70	33.7%	63	34.1%
High school graduate/GED	45	21.6%	38	20.5%
Some college	52	22.8%	46	24.9%
Bachelor's	33	15.9%	29	15.7%
Graduate education	8	3.8%	8	4.3%
Summer participation	76	37.0%	69	38.0%
Male	74	36.0%	62	34.0%

Study Variables	*M*	*SD*	Range
Depressive symptoms T2	18.52	10.43	0.00 – 53.00
Familism total	3.76	.69	1.50 – 5.00
Familism support	3.95	.76	1.67 – 5.00
Familism obligation	3.84	.70	1.40 – 5.00
Familism referent	3.45	.82	1.00 – 5.00
Family communication	3.41	.77	1.10 – 5.00
Sleep duration	6.58	.95	3.91 – 9.16
Sleep problems	6.63	2.99	0.00 – 14.00
Depressive symptoms T1	16.36	10.22	0.00 – 50.00
Parent education level	3.73	2.35	1.00 – 10.00
Immigrant generation score (continuous)	2.63	2.33	0.00 – 7.00

Note. $N = 209$ at T1 (January 2017 – July 2017). $N = 185$ at T2 (September 2017 – December 2017). One participant did not provide demographic information. Summer participation: 1 = study completed in summer months, 0 = study completed during school year; Male: 1 = male, 0 = female. Parent education level: 1 = less than high school to 10 = doctorate or advanced degree. Immigrant generation score 0 = participant, both parents, and both sets of grandparents born outside U.S. to 7 = participant, parents, and both sets of grandparents born in United States.
[a]Could select more than one

Table 2

Summary of Correlations Among Primary Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Depressive symptoms T2	--												
2. Familism total	-.05	--											
3. Familism support	-.08	.92***	--										
4. Familism obligation	.00	.90***	.74***	--									
5. Familism referent	-.05	.92***	.75***	.76***	--								
6. Family communication	-.36***	.25**	.25***	.13†	.26***	--							
7. Sleep duration	.15†	.12	.13†	.05	.10	-.00	--						
8. Sleep problems	.28***	-.06	-.05	-.03	-.10	-.22**	-.17*	--					
9. Depressive symptoms T1	.49***	-.08	-.06	-.05	-.12†	-.42***	.03	.50***	--				
10. Parent education	-.12	-.18*	-.14*	-.21**	-.14	.05	-.02	-.06	-.09	--			
11. Immigrant generation	.08	-.02	-.06	.01	-.01	.06	-.03	.09	-.03	.44***	--		
12. Summer	-.00	.00	.05	-.08	.01	-.07	.27***	-.05	.03	-.07	-.09	--	
13. Male	-.20*	.04	-.04	.07	.10	.13	-.29***	-.23**	-.21**	.10	.04	.06	--

Note. † $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

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Table 3

OLS Regression Analyses Predicting Depressive Symptoms in College from Family Communication, Familism Values, and covariates

Model Predictors	Model 1 Est(*SE*)	Model 2 Est(*SE*)	Model 3 Est(*SE*)	Model 4 Est(*SE*)
Intercept	1.80(.13)***	1.80(.13)***	1.80(.13)***	1.81(.13)***
Familism				
Total	.09(.07)	--	--	--
Support	--	.02(.07)	--	--
Obligation	--	--	.09(.07)	--
Referent	--	--	--	.10(.07)
Family communication	-.23 (.07)***	-.22(.07)**	-.22(.07)***	-.23(.07)***
Depressive symptoms T1	.41 (.07)***	.41(.07)***	.41(.07)***	.41(.07)***
Parent education	-.10 (.07)	-.12(.07)†	-.09(.07)	-.10(.07)
Immigration generation	.15 (.07)*	.16(.07)*	.15(.07)*	.15(.07)*
Summer	-.01 (.06)	-.01(.06)	-.00(.06)	-.01(.06)
Sex	-.09 (.06)	-.08(.07)	-.09(.06)	-.09(.06)
R^2	.34 (.06)***	.33 (.06)***	.35 (.06)***	.34 (.06)***

Note. Covariates, predictors, and moderators were grand mean centered. Sex (1 = male). Est. = standardized partial regression coefficient estimate. *SE* = robust standard error.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4

OLS Regression Analyses Predicting Depressive Symptoms in College from Family Communication, Familism values, and Interactions with Sleep Duration

Model Predictors	Model 1 Est(SE)	Model 2 Est(SE)	Model 3 Est(SE)	Model 4 Est(SE)	Model 5 Est(SE)
Intercept	1.79 (.13)***	1.80 (.13)***	1.78 (.13)***	1.80 (.13)***	1.80 (.13)***
Familism					
Total	.08 (.07)	--	--	--	.08 (.07)
Support	--	.01 (.07)	--	--	--
Obligation	--	--	.10 (.07)	--	--
Referent	--	--	--	.09 (.07)	--
Family communication	-.24 (.07)***	-.22 (.07)**	-.23 (.07)***	-.24 (.07)***	-.24 (.07)***
Sleep duration	.11 (.07)	.12 (.07)†	.12 (.07)†	.11 (.07)	.11 (.07)
Interaction term					
Total	.00 (.07)	--	--	--	--
Support	--	-.04 (.07)	--	--	--
Obligation	--	--	.03 (.07)	--	--
Referent	--	--	--	.01 (.07)	--
Family communication	--	--	--	--	-.00 (.07)†
Depressive symptoms in T1	.41 (.07)***	.41 (.07)***	.42 (.07)***	.41 (.07)***	.41 (.07)***
Parent education	-.01 (.07)	-.12 (.07)†	-.09 (.07)	-.10 (.07)	-.10 (.07)
Immigration generation	.15 (.07)*	.16 (.07)*	.14 (.07)*	.15 (.07)*	.15 (.07)*
Summer	-.04 (.07)	-.04 (.07)	-.03 (.07)	-.04 (.07)	-.04 (.07)
Sex	-.05 (.07)	-.04 (.07)	-.05 (.07)	-.05 (.07)	-.05 (.07)
R^2	.35 (.06)***	.34 (.06)***	.36 (.06)***	.35 (.06)***	.35 (.06)***

Note. Covariates, predictors, and moderator were grand mean centered. Sex (1 = male), objective sleep duration was collected during high school or summer before college. Interaction terms were computed after centering the predictors and moderator. Results were consistent when individuals with fewer than 5 nights of sleep were excluded from analyses (N=9). Est. = standardized partial regression coefficient estimate. *SE* = robust standard error.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 5

OLS Regression Analyses Predicting Depressive Symptoms in College from Family Communication, Familism values, and Interactions with Sleep Problems

Model Predictors	Model 1 Est(SE)	Model 2 Est(SE)	Model 3 Est(SE)	Model 4 Est(SE)	Model 5 Est(SE)
Intercept	1.77 (.13)***	1.80 (.13)***	1.78 (.13)***	1.80 (.13)***	1.80 (.13)***
Familism					
Total	.09 (.07)	--	--	--	.09 (.07)
Support	--	-.01 (.07)	--	--	--
Obligation	--	--	.07 (.07)	--	--
Referent	--	--	--	.09 (.07)	--
Family communication	-.23 (.07)***	-.21 (.07)**	-.22 (.07)***	-.24 (.07)***	-.23 (.07)***
Sleep problems	.07 (.07)	.08 (.07)†	.06 (.07)†	.06 (.07)	.06 (.07)
Interaction term					
Total	.10 (.07)	--	--	--	--
Support	--	.14 (.07)*	--	--	--
Obligation	--	--	.07 (.07)	--	--
Referent	--	--	--	.08 (.07)	--
Family communication	--	--	--	--	-.01 (.07)
Depressive symptoms in T1	.38 (.07)***	.38 (.07)***	.38 (.07)***	.38 (.07)***	.39 (.07)***
Parent education	-.09 (.07)	-.10 (.07)†	-.09 (.07)	-.09 (.07)	-.10 (.07)
Immigration generation	.13 (.07)*	.14 (.07)*	.13 (.07)*	.14 (.07)*	.15 (.07)*
Summer	.00 (.06)	.00 (.06)	-.01 (.06)	-.00 (.06)	-.01 (.06)
Sex	-.07 (.06)	-.08 (.06)	-.08 (.07)	-.08 (.06)	-.08 (.07)
R²	.36 (.06)***	.36 (.06)***	.36 (.06)***	.36 (.06)***	.35 (.06)***

Note. Covariates, predictors, and moderator were grand mean centered. Sex (1 = male), subjective sleep problems were collected during high school or summer before college. Interaction terms were computed after centering the predictors and moderator. Est. = standardized partial regression coefficient estimate. *SE* = robust standard error.

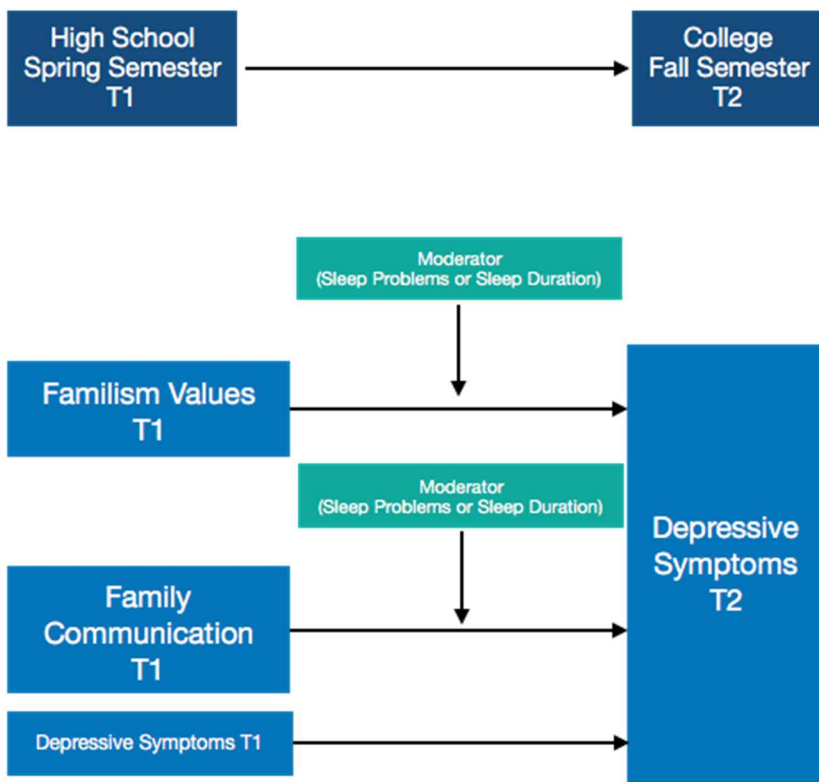† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

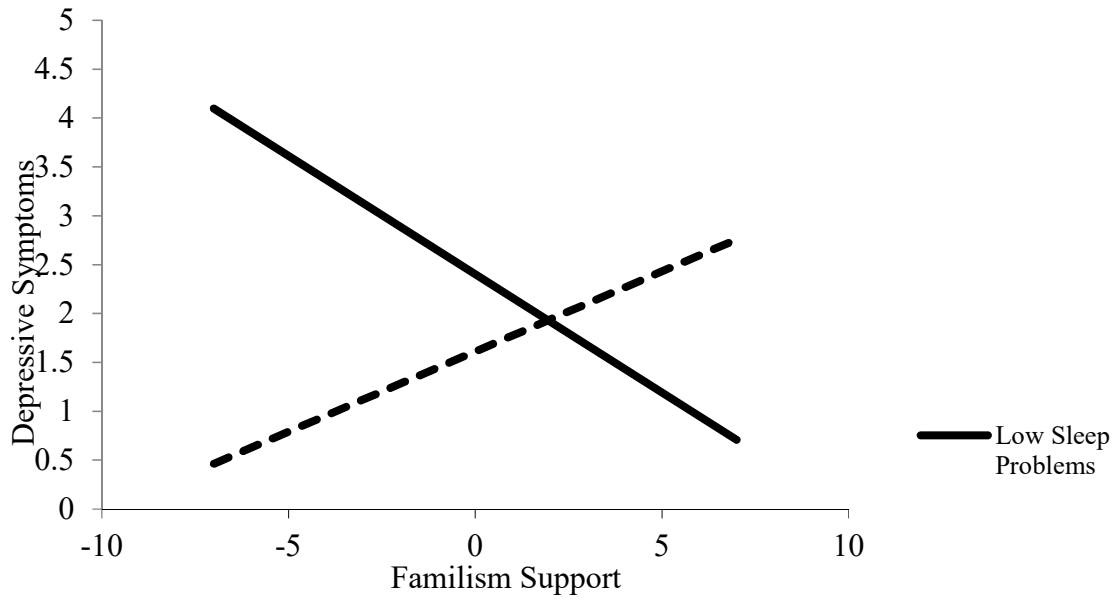*Figure 1*. Theoretical model of the longitudinal study

Figure 2. Moderating Role of Sleep Problems on Familism Support and Depressive Symptom