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## Cumulative Neighborhood Risk and Subsequent Internalizing Behavior among Asian American Adolescents

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### Abstract

Neighborhood disadvantage is a developmental context that may contribute to Asian American adolescent internalizing problems, yet there is a dearth of longitudinal studies as well as examination of cultural protective factors. Co-ethnic density, or the proportion of individuals of the same racial/ethnic background in the neighborhood that is often cited as a protective factor for racial/ethnic minority groups, has not been adequately examined in Asian American youth. This study examined the longitudinal association between cumulative neighborhood risk and internalizing behavior, and the moderating role of sex and co-ethnic density using an Asian American subsample ( $N = 177$ ; 45.2% female; ages 10–12, 14–15; Cambodian, Chinese, Filipino, Hmong, Japanese, Korean, Laotian, Samoan, Vietnamese, and other ethnic backgrounds) of a longitudinal panel study over a span of 6 years. Cumulative neighborhood risk during early adolescence (ages 10–14) was significantly associated with internalizing behavior at mid-adolescence (age 15) controlling for prior levels of internalizing behavior. There was no evidence of moderation by co-ethnic density or sex, indicating that reducing neighborhood disadvantage

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#### Authors' Contributions

WL conceptualized the study design, prepared the data, performed statistical analyses, led the drafting of the manuscript, and coordinated different versions of manuscript; DAH contributed to the conceptualization of the study and interpretation of findings and helped to draft the manuscript; KG contributed to interpretation of findings; RK contributed to the acquisition of funding, data construction, and the interpretation of findings; JOL contributed to the conceptualization of the study, data construction and troubleshooting in data analyses, and interpretation of findings and helped to draft the manuscript. All authors read and approved the final manuscript.

Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no competing interests.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All study procedures were approved by the Human Subjects Review Committee of the University of Southern California.

**Informed Consent** Informed consent was obtained from all participants included in the study.

may be a promising preventive measure to address mental health problems for both sexes of Asian American adolescents.

### Keywords

Neighborhood risk; Asian American; Adolescence; Mental health

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### Introduction

Neighborhood is a key context that affects adolescents' psychological adjustment (Leventhal, 2018). Current research demonstrates a consistent link between neighborhood disadvantage and adolescent internalizing problems (Barr, 2018). Research has also highlighted the potentially protective role of co-ethnic density (the proportion of individuals of the same racial/ethnic background concentrated in the neighborhood) in the association between neighborhood disadvantage and mental health among racial/ethnic minority youth. However, Asian American adolescents have been mostly overlooked in the relevant literature, although they are the fastest growing racial/ethnic minority group and the second largest foreign-born group, projected to comprise about 10% of the total population by 2060 (Colby & Ortman, 2015). Despite the myth of —model minority‖ that implies Asian Americans have low mental and behavioral health problems, Asian American youth demonstrate substantial levels of mental health problems. However, there is a lack of clarity in neighborhood-level factors contributing to mental health among Asian American adolescents (Zhou et al., 2012), thus pointing to a research need in identifying contextual predictors (Wyatt et al., 2015) as well as protective factors (Cornejo et al., 2020) of mental health for this group. To address these gaps, the current study examined the association between cumulative neighborhood disadvantage and internalizing problems among Asian American adolescents and the moderating roles of sex and co-ethnic density.

### Neighborhood Disadvantage for Adolescents

Neighborhood disadvantage may represent a key yet understudied risk factor contributing to internalizing problems in Asian American youth. Ecological theory (Bronfenbrenner & Morris, 2006) suggests that neighborhood is one of the key contexts for youth mental health going beyond family socioeconomic status, a characteristic well-known to be related to adolescent mental health (Reiss, 2013). Neighborhood context may be particularly relevant for adolescents as this developmental period is associated with increasing levels of autonomy and independent exploration of neighborhood environments (Leventhal, 2018; Sharkey & Faber, 2014). Neighborhood disadvantage may be defined as a multidimensional cluster of indices such as neighborhood poverty level, percentage of those who are unemployed, percentage of individuals with education level lower than high school diploma, or percentage of female-headed households, usually relying on census block or tract level data (Leventhal & Brooks-Gunn, 2000). Neighborhood disadvantage may predict adverse behavioral and emotional health by limiting access to institutional resources (e.g., learning opportunities or social and recreational activities) and quality relationships and availability of support networks (Leventhal & Brooks-Gunn, 2000). Evidence suggests that neighborhood disadvantage is associated with stress reactivity (Hackman et al., 2019).

Consistent with this notion, neighborhood disadvantage has been linked to youth mental health challenges including depression (Choi et al., 2021), general anxiety (Furr-Holden et al., 2011), and other emotional and behavioral health outcomes (Snedker & Herting, 2016) among children and adolescents. Additionally, given that the mean age of onset for depressive symptoms is approximately 14 years (Nivard et al., 2017), adolescence may be a time when the association between neighborhood factors and internalizing behavior begins to manifest.

Neighborhood disadvantage is a cluster of multidimensional risk factors (Sampson et al., 2002) which may be significant in understanding long-term adolescent mental health. From the life course perspective, as the number and/or duration of risk exposure over the course of earlier developmental periods increases, cumulative damage to health might also increase (i.e., accumulation hypothesis) (Ben-Shlomo & Kuh, 2002). The stress processing theory (Pearlin et al., 2005) may explain how neighborhood disadvantage influences the course of mental health by putting those who are experiencing disadvantage in continued exposure to adverse circumstances, thus taking a long-term toll on their mental health. Supporting this conceptual speculation, a longitudinal relationship between childhood cumulative risk across domains (Elovainio et al., 2015) as well as cumulative risk over time (Evans & Cassells, 2014) and later mental health outcomes has been reported. Examining cumulative risk that includes both frequency and intensity of economic deprivation over a period of time, compared to a snapshot of risk at one point in time, may be key to understanding how neighborhood poverty impacts long-term mental health (Evans, 2004).

### **Neighborhood Disadvantage among Asian American Adolescents**

Previous literature on Asian American youth is sparse and have produced mixed findings. A cross-sectional study on Chinese American children (ages 6–9) found that neighborhood disadvantage, as measured by domains of public assistance, unemployment, and poverty from the census, was not concurrently associated with internalizing problems during middle childhood (Lee et al., 2014). Similarly, another study that focused on Chinese American adolescents also found no significant association between a similar neighborhood disadvantage index on education, unemployment, female-headed households, and poverty measured in 6<sup>th</sup> grade and depressive symptoms measured in 8<sup>th</sup> grade (Wei et al., 2020). However, none of these studies examined whether repeated, prolonged cumulative exposure to neighborhood risk plays an important role in Asian youth's mental health problems. Given that accumulation of neighborhood risk exposure may be damaging to mental health especially during early adolescence, studying the role of cumulative neighborhood disadvantage over time may be key in understanding internalizing problems among Asian youth.

The segmented assimilation theory (Portes & Zhou, 1993) provides a useful framework and sociohistorical context for understanding how neighborhood disadvantage has implications for Asian American adolescent mental health. In contrast to the view that adaptation follows a homogeneous trend (Gordon, 1964), the segmented assimilation theory suggests that immigrants face upward, horizontal, or downward mobility depending on the context of reception into the host country, where the social environment and cultural patterns provide

opportunities as well as constraints for immigrants (Zhou & Xiong, 2005). Specifically, the path of mobility across generations model (Portes et al., 2009) suggests the individual-level experiences may interact with macro-level contexts to predict successful integration or alternatively downward mobility into poverty or deviant lifestyles across generations. Thus, the neighborhood environment immigrants settle into, especially when marked by long-term exposure to concentrated poverty or racial segregation, as well as potential resources such as the presence of co-ethnic communities, may interactively have important consequences in the lives of both immigrants and their children (Suárez-Orozco & Suárez-Orozco, 2009). The social and economic mobility trajectories may in turn translate to children's outcomes, including mental health.

### Co-ethnic Density

Many racial/ethnic minority and immigrant groups tend to settle in ethnic enclaves (Logan & Zhang, 2013), and co-ethnic density is thus potentially an integral part of neighborhood contexts for Asian youth. Co-ethnic density, the proportion of individuals of the same racial/ethnic background concentrated in the neighborhood, is found to be both promotive and inhibitive of adolescent behavioral problems across race/ethnicity potentially because of the dual nature of co-ethnic density in which access to some developmental resources are promoted while others are constrained (White et al., 2020). On one hand, it may promote social support and cohesion (Browning et al., 2016) and may buffer the damaging impact of neighborhood risk on mental health (Lee & Liechty, 2015), which is in line with the ethnic density hypothesis, which suggests better mental health outcomes when individuals live in areas with others of the same racial/ethnic background (Halpern, 1993). This notion may be particularly relevant for Asian Americans. A higher proportion (57%) of Asian Americans are born outside of the country and a majority (66%) speaks a language other than English at home (Budiman & Ruiz, 2021). Thus, living in areas of higher co-ethnic density may buffer the adverse effects from language and cultural barriers. Accordingly, some studies have documented that living in Asian ethnic neighborhoods is associated with positive outcomes such as educational achievement (Zhou & Kim, 2006) and stronger ethnic identity (Juang & Nguyen, 2010) for Asian American youth. Whether such protection extends to mental health outcomes is less known. On the other hand, following the residential segregation hypothesis, which suggests worse mental health outcomes when living in areas of individuals of same racial/ethnic background (Mair et al., 2010)—disadvantages associated with segregation and constrained access to resources may be compounded with the cultural and language barriers that already exist in immigrant/minority communities, thus exacerbating the effects of other environmental risk (White et al., 2020). A study has found that co-ethnic density was indirectly associated with increased mental health problems in Chinese children (Lee et al., 2014). In summary, there is evidence to suggest that co-ethnic density in a neighborhood may either buffer or exacerbate the deleterious impact of neighborhood disadvantage on internalizing problems among Asian American youth. However, the role of co-ethnic density in shaping internalizing problems specifically among Asian adolescents has not received empirical attention.

## Sex Differences

Gender socialization theory posits that there are gender differences in the manifestation of responses to stressors (Chodorow, 1978), such as neighborhood risk. Responding to the same strain differently, females may express affect inwardly compared to males and thus may internalize the effect of distress rather than externalize (Broidy, 2001). Supporting such speculation, it has been found that the impact of neighborhood-level income inequality on internalizing behavior was stronger for female adolescents (Pabayo et al., 2016). Similarly, other studies (Leventhal & Dupéré, 2011; Ludwig et al., 2013) have found moving to higher income neighborhoods had beneficial impact on girls' internalizing behavior compared to boys, indicating differential impacts of neighborhood factors depending on the sex. As existing studies consisted of primarily African American and Latinx samples, however, it is unclear whether such findings can also be extended to Asian American adolescents. A similar sex difference may be observed in Asian American youth. Indeed, Asian American females have also reported higher risk for depression compared to their male counterparts (Wyatt et al., 2015). Following the gender strain theory (Broidy, 2001), which suggests that girls may experience more internalizing problems in response to neighborhood risk than boys, the association between neighborhood disadvantage and internalizing problems may be stronger in Asian American females compared to males. However, no studies have empirically tested possible sex differences.

## Current Study

It is plausible that accumulated neighborhood risk is associated with higher levels of Asian American adolescent mental health problems, but the dearth of research on this association and the specific risk and protective factors involved leaves a significant gap in addressing mental health problems. Based on what is known about the developmental aspect of neighborhood risk effects during adolescence as well as the ecological context in which the lives of Asian American adolescents are embedded, this study tested three primary hypotheses. First, cumulative exposure to neighborhood risk over time was hypothesized to affect subsequent internalizing behavior in Asian youth. Secondly, according to the ethnic density hypothesis, it was predicted that co-ethnic density would buffer the impacts of neighborhood risk on internalizing problems, while based on the residential segregation hypothesis, it was predicted that co-ethnic density would exacerbate the association. Lastly, it was hypothesized that neighborhood influences on internalizing problems would be greater for females.

## Methods

### Participants and Procedure

Data came from a sub-sample of the Seattle Social Development Project (SSDP), a longitudinal panel study on risk and protective factors for a broad range of developmental outcomes including adolescent mental health. A portion of respondents participated in a preventive intervention program based on parent and teacher workshops (Kosterman et al., 2019). Data collection began in 1985 when participants were in fifth grade and were followed until age 39. Recruitment was targeted to 18 Seattle elementary schools serving

higher crime neighborhoods. All fifth-grade students ( $N = 1053$ ) in the chosen schools were invited to participate in the SSDP study, and 77% of students and their families ( $N = 808$ ) consented to the longitudinal study. Interviews were conducted face-to-face at private places of participants' choice. The current analysis focused on the data collected in late childhood (age 10) and adolescence (ages 11–15) that included both the intervention and control groups. On average, 90% of the panel has been retained during those annual assessment points. Of the 808 participants, those who identified as 1<sup>st</sup> generation (foreign-born to foreign-born parents) ( $N = 98$ ; 58%), 2<sup>nd</sup> generation (U.S.-born to one or both foreign-born parents) ( $N = 61$ ; 36%), and 3<sup>rd</sup> generation (U.S.-born to U.S.-born parents) ( $N = 11$ ; 6%) Asian American adolescents of Cambodian, Chinese, Filipino, Hmong, Japanese, Korean, Laotian, Samoan, Vietnamese, and other ethnic backgrounds were included in the analysis sample for the current study ( $N = 177$ ). The exact ethnic composition was not available as indicating specific ethnic background was optional. The subsample was 45.2% female, and over 68% of the participants were from economically disadvantaged families, as evidenced by eligibility for the National School Lunch/School Breakfast program (see Table 1). Detailed descriptions regarding sampling and study procedures have been described previously (Hawkins et al., 2003). This study was approved by the Human Subjects Review Committee at the University of Washington.

## Measures

**Cumulative neighborhood risk (ages 10–14).**—Participant addresses at each age (10, 11, 12, 14) were geocoded and linked to their census block groups respectively. There was a total of 89 block groups. The average number of students per block group ranged from 1–9 across different timepoints. In the current sample ( $N = 177$ ), a majority (54.8%;  $N = 97$ ) of the participants lived in the same census block throughout the four time points. 36.2% ( $N = 64$ ) moved once, 8.5% ( $N = 15$ ) moved twice, and .6% ( $N = 1$ ) moved three times. A closer exploration revealed that a very small proportion of the sample had experienced substantial changes in neighborhood over time (e.g., a score changes from 1 to 7 in neighborhood risk score), indicating that a majority of study participants have lived in a similar environment, even if when they moved to a different census block. Thus, a sum score of neighborhood risk at each timepoint was used. Consistent with other studies using SSDP data (Herrenkohl et al., 2002; Lee et al., 2018), the current study used 8 census block items from the 1990 census—proportions of individuals without a high school diploma or the equivalent (averaged across 4 timepoints = 27.02%,  $SD = 10.89$ ), households receiving public assistance income ( $M = 14.89\%$ ,  $SD = 12.14\%$ ), families living in poverty ( $M = 16.25\%$ ,  $SD = 16.85\%$ ), unemployed males ( $M = 9.21\%$ ,  $SD = 7.49\%$ ) and females ( $M = 7.94\%$ ,  $SD = 8.08\%$ ), single-parent, female-headed households ( $M = 18.51\%$ ,  $SD = 10.19\%$ ), owner-occupied homes ( $M = 53.55\%$ ,  $SD = 22.01\%$ ; owner-occupied = 0, non-owner-occupied = 1), and median family income ( $M = \$30,940.48$ ,  $SD = \$10523.62$ ; greater than equal to mean = 0, below the mean = 1) were dichotomized at the mean. Of note, dichotomization at the mean as opposed to the riskiest 25<sup>th</sup> percentile was chosen as the quartiles approach might underestimate the risk the sample was exposed to. The mean in the SSDP was high and comparable to the riskiest 25<sup>th</sup> percentile at the national level for available and equivalent variables from the 1990 census: proportion of individuals without a high school diploma or the equivalent (24.8%), families in poverty (10.0%), and median

household income (\$30,056). The resulting categorical risk indicators were summed at each age and averaged across the four time points to create a total average neighborhood risk score to represent cumulative childhood and adolescent neighborhood risk exposure (see Table 1).

**Internalizing behavior (age 15).**—Internalizing behaviors were measured with a subset of items from the Youth Self-Report (YSR) (Achenbach & Rescorla, 2001). For the study, 11 youth self-report items (e.g., —I worry a lot, —I like to be alone, —I am withdrawn, don't get involved with others) were used. Responses were on a scale of 0 (not true) to 2 (often true). The validity and reliability of YSR have been tested for younger as well as older youth (Ebesutani et al., 2011). Reliability and validity of the CBCL have also been demonstrated in culturally diverse samples including Asian youth (Ivanova et al., 2007). An average score across the 11 items was computed to indicate internalizing behavior ( $\alpha = .77$ ).

**Co-ethnic density.**—The average proportion of Asian Americans (Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, or Other Asian) in the neighborhood during ages 10, 11, 12, and 14 was used to measure co-ethnic density (see Table 1).

**Covariates.**—Covariates included sex (male = 0; female = 1) and immigrant generation status (1<sup>st</sup> vs. 2<sup>nd</sup> and 3<sup>rd</sup>) (Marks et al., 2014). Family SES was indicated by school-reported eligibility for the free lunch program at ages 10–12 (low SES = 1). Earlier internalizing behavior at age 10 was measured from the Full Teacher-Report (TRF) (Achenbach & Rescorla, 2001). Reliability and validity of the TRF have been demonstrated in cross-cultural samples including Asian youth (Rescorla et al., 2007). An average score across 32 items reported on a scale of 0 (not true) to 2 (often true) was used ( $\alpha = .86$ ).

## Analytic Strategies

Multiple regression was used to examine the association between neighborhood risk and internalizing problem. To examine moderation by co-ethnic density and sex, interactions between neighborhood risk and each moderator were added to separate models given the independent theoretical basis for each moderator. Neighborhood risk and co-ethnic density were centered in all models with interactions. All models adjusted for covariates. Of note, given that participants were nested in 89 block groups, intraclass correlation ( $ICC = <.01-.03$ ) was calculated at each timepoint (age 10, 11, 12, 14), suggesting no empirical evidence for spatial clustering issue. Given the design of the study in which part of the sample was assigned to a preventive intervention group during the elementary school years, a multiple group covariance equivalence test was run to examine possible differences across the control and full groups in the covariance among study variables. The results showed differences in one relationship (stronger association between free lunch eligibility and neighborhood risk in the intervention group) but did not substantively change interpretation of the overall results from the full sample analysis. All analyses were conducted in Mplus version 8 (Muthén & Muthén, 1998–2017). Data were managed using full information maximum likelihood estimation (FIML), a method recommended to handle missing data (Schlomer et al., 2010). Given that the retention rate was consistently high and nonparticipation was not systematically related to sex, family SES or internalizing behavior

at age 15 (Hawkins et al., 2003), attrition was unlikely to introduce sample bias in the current analysis.

## Results

Descriptive statistics and correlations among study variables are presented in Table 1 and Table 2. To test the hypothesis that cumulative exposure to neighborhood risk is associated with subsequent internalizing behavior in Asian youth, a multiple regression was estimated. As illustrated in Table 3, Model 1, cumulative neighborhood risk during early adolescence was significantly associated with higher levels of later internalizing behavior at age 15 ( $b = .03, p = .011$ ). These associations accounted for earlier internalizing behavior, sex, family SES, co-ethnic density, and generation status. A sensitivity analysis that included the number of moves as an additional control variable was conducted. There were no substantive changes to the results with the additional control variable. Additionally, the role of social cohesion, documented as an important factor for youth's mental health (Kingsbury et al., 2020), was explored. Results indicated that social cohesion (measured at age 13; e.g., I like my neighborhood, I feel safe in my neighborhood, I want to stay in my neighborhood, and I am satisfied with my neighborhood) was found to be non-significant ( $b = -.07, p = .061$ ). When entered in the model with cumulative disadvantage, cumulative disadvantage remained significant ( $b = .03, p = .039$ ) while cohesion was not significant ( $b = -.05, p = .190$ ). Given the main focus on disentangling the complex interplay between neighborhood deprivation and co-ethnic density rather than examining a wide range of neighborhood features, neighborhood cohesion was not included in the final model.

Next, to examine the hypothesis that co-ethnic density was a moderator of the association between cumulative neighborhood risk, an interaction term between neighborhood risk and co-ethnic density was added to Model 1 with all covariates. The interaction between neighborhood risk and co-ethnic density was not significant ( $b = .0003, p = .652$ ) (Table 3, Model 2) and thus did not support the hypotheses that co-ethnic density would buffer or exacerbate the neighborhood influences. Subsequently, an interaction term between sex and neighborhood risk was added and tested following the same steps with all covariates (Table 3, Model 3). The interaction was also not significant, ( $b = .003, p = .888$ ). Thus, the hypothesis that the association between neighborhood disadvantage and internalizing behavior would be stronger for females was not supported.

## Discussion

Cumulative neighborhood disadvantage may be a salient predictor of adolescent internalizing problems among youth due to 1) increased independence and autonomy (Leventhal, 2018) as well as more awareness of environmental risk (Benner & Kim, 2009) and 2) likelihood of internalizing problems surfacing (Dekker et al., 2007) during adolescence. Emerging evidence suggests that *cumulative* neighborhood risk over time may be key to understanding the contributing ecological factors to internalizing problems. However, prior studies have not examined such a relationship among Asian adolescents. Specifically, the current literature on Asian American adolescents is limited in the following ways: 1) the cumulative aspect of neighborhood risk has not been taken into account; 2)



only one study has focused on adolescence (i.e., Wei et al., 2020); and 3) the roles of co-ethnic density and sex in the association between neighborhood risk and internalizing problems have not been investigated. These gaps in the current literature may hinder the ability to identify neighborhood intervention targets to address the increasing levels of mental health problems for Asian American adolescents. The current study addresses these gaps by examining the longitudinal associations between cumulative neighborhood risk and mental health problems.

### **The Role of Cumulative Neighborhood Risk on Later Adolescent Mental Health**

As suggested by the ecological theory (Bronfenbrenner & Morris, 2006) and the life course perspective (Elder Jr., 1994), the study findings support the hypothesis that cumulative neighborhood risk exposure over time within late childhood and early adolescence is associated with later internalizing problems among Asian American youth, thus highlighting the significance of risk exposure compounded during the formative years of late childhood and early adolescence. Prior studies did not find a significant role of neighborhood risk for internalizing problems for Asian American children aged 6–9 (Lee et al., 2014). It is important to consider the timing of exposure during early adolescence (ages 10 to 14), however, which is when youth begin to gain more autonomy and their sphere of interaction expands from bounds of the home (Sharkey & Faber, 2014). Adolescence may be a sensitive period when risk exposure confers a greater impact on mental health than other life stages (Kuh et al., 2003), potentially through more direct and increased exposure to the neighborhood. It may explain the significant link between neighborhood risk and adolescent internalizing problems found in the current study as opposed to the null association found for younger Chinese American children (ages 6–9) during middle childhood (Lee et al., 2014). Another possible explanation might be that the current study utilizes a sample of pan-Asian American ethnic group as compared to examining a single Asian ethnic group. Potentially, the link may be driven by less studied Southeast Asian American ethnic groups, although such effect is not testable in the current study given the limited sample size of each Asian ethnic group and lack of information on the exact composition of ethnic groups. Given that the differences among varying Asian ethnic groups are not yet well-known, however, the current finding may serve as a starting point of exploring the collective experience pertaining to neighborhood environment. The historical context of the data collection period may also offer an explanation. The 1980s and 1990s, when the current data were collected, were pivotal points for urban redevelopment associated with increased gentrification and decrease in crime rates in Seattle (Kreager et al., 2011). The findings may be especially relevant for neighborhoods of today that are in similar transitional periods.

The study also used a cumulative risk model to understand the way in which risk may be compounded throughout a particularly sensitive developmental period of early adolescence (Elovainio et al., 2015). As informed by the stress processing theory (Pearlin et al., 2005) and life course perspective (Elder Jr., 1994), chronic exposure to neighborhood risk across early adolescence may be a process during which the early disadvantage may lead to a chain of events that further exacerbates the toll on mental health. The consideration of cumulative neighborhood risk exposure over time may account for the significant association found in the current study as opposed to the null findings in Chinese adolescents

(Wei et al., 2020), which examined a longitudinal relationship between neighborhood risk and internalizing problems but did not measure the prolonged cumulative aspect of neighborhood disadvantage across adolescence. Potentially, focusing on one specific time point for neighborhood risk may not be enough to fully capture the extent of the risk. Overall, the results are in line with the notion that the cumulative risk perspective in understanding neighborhood disadvantage is an important consideration for understanding the impact of risk from this particular developmental period.

### Co-ethnic Density

Co-ethnic density, found to be a potential protective factor for other racial/ethnic minority youth (Lee & Liechty, 2015), was not found to mitigate nor exacerbate the effect of neighborhood disadvantage on internalizing symptoms among Asian American youth. Neither the ethnic density hypothesis (Halpern, 1993) nor the residential segregation hypothesis (Mair et al., 2010) was supported in the current study, thus pointing to neither better or worse outcomes associated with living with others who are of the same ethnic background. Neighborhood disadvantage was associated with more internalizing problems, whether the level of co-ethnic density was high or low, suggesting that neighborhood-level intervention efforts may be applicable to Asian American adolescents regardless of co-ethnic density. Immigration history unique to Asian and/or immigration generation differences may explain the current findings. Asian Americans differ in recency of immigration compared with many other ethnic minority groups (Budiman & Ruiz, 2021), and some evidence suggests that co-ethnic density may be more protective for first generation compared to later generation immigrants as resources available through the presence of co-ethnic population have more meaningful contribution to the well-being of first-generation immigrants, given the language and cultural barriers that later generations may not face (Morenoff & Astor, 2006). A majority of the current sample consisted of second-generation Asian Americans, however, and the protective effect of co-ethnic density in the association of neighborhood disadvantage and mental health may not be as relevant for later generation Asian American adolescents, thus supporting the null findings of co-ethnic density as a moderator. Testing the interaction among generation status, co-ethnic density, and neighborhood disadvantage is not interpretable in the current study given the limited sample size, but future research may explore the potential differential effect of generations on the protective mechanisms of co-ethnic density against neighborhood disadvantage.

### Sex Differences

No sex differences were found in the association between neighborhood risk and internalizing problems, suggesting similar neighborhood associations for males and females. Previous findings in racially diverse samples of adolescents indicate that the impact of neighborhood disadvantage on internalizing problems is amplified for girls more than for boys (Leventhal & Dupéré, 2011; Ludwig et al., 2013). However, such findings were not extended to Asian American youth in the current study. Diminishing differences in the recent decades between the genders in their behavior and expectations have been observed and may potentially explain the similar magnitude of neighborhood risk associations (Priess et al., 2009). Indeed, these trends have been observed in both high-income western countries as well as urban regions in Asia (Yu et al., 2017). Current findings may

support the extension of diminishing gender differences to neighborhood influences on adolescent mental health. It is also important to note that the significant association between neighborhood risk and internalizing problems was evident for boys as well as girls. Thus, it highlights the importance of understanding the role of neighborhood risk in internalizing problems in boys, which has not received much empirical attention.

### Implications

The current study points to the importance of extending beyond proximal factors to target neighborhood processes in addressing Asian American adolescents' internalizing behavior. Existing strategies may place the burden of improving child behavior and functioning on individual-level causes such as parenting, family conflict, or biological factors stemming from the framework of the traditional disease model (Kieling et al., 2011). Current findings offer further support for allocating resources on programs that broadly prevent mental health problems in vulnerable populations such as Asian American youth living in disadvantaged neighborhoods compared to programs that focus on identifying and treating mental health symptoms of individual children (Cuellar, 2015). These resources may be particularly important for Asian American youth who are more likely to live in ethnic enclaves and experience added burdens of language and cultural barriers. Although this study does not suggest causation, the study findings on the longitudinal impact of repeated, cumulative exposure to neighborhood risk suggest prevention focused practice and policy strategies targeted at earlier risk exposures to reduce the burden of mental health problems during adolescence in Asian youth. Secondly, this study demonstrates the potentially detrimental effects of prolonged exposure to neighborhood risk, demonstrating the added vulnerability of youth who are in persistent poverty marked by lower levels of institutional resources and social network. Examination of these potential mechanisms through which cumulative neighborhood risk impedes Asian American adolescent mental health may reveal additional opportunities for prevention and intervention strategies, such as redistribution of neighborhood resources to alleviate systemic inequities and instituting educational and social support services that can mitigate resource deprivation. The null findings in sex and co-ethnic density as moderators suggest the pervasiveness of neighborhood risk's association with Asian youth's internalizing problems and the need for comprehensive approach to prevention and intervention. Further exploration of culturally specific protective factors that may buffer the effect of neighborhood disadvantage is needed to promote the mental health of Asian American youth living in disadvantaged areas.

### Limitations and Strengths

A few caveats should be taken into consideration in interpreting the above findings. First, the moderate sample size may not be sufficient to capture potential significant moderation that could be present. Also, given that the current sample is based in a single region, generalizability is limited. Further, because it is a relatively high-risk sample, the results may not be generalizable. Second, the current data did not allow for exact composition of the ethnic background and thus a pan-Asian American ethnicity was used. The use of pan-Asian American grouping can also overlook potential Asian ethnic subgroup differences (Chu & Sue, 2011). Additionally, there may be potential third variables relevant to internalizing

behavior that were not accounted for such as factors embedded in the family (Kim et al., 2009), peer group, and school (Arora et al., 2020) among Asian youth.

On the other hand, the current study also includes important strengths. First, use of longitudinal measures allows for an examination of prospective association between cumulative neighborhood risk and subsequent trajectory of internalizing problems. The study also used an objective measure of neighborhood assessments, which were created by combining 8 different measures over multiple timepoints, which provided a robust measure of risk exposure. The current study also tested for moderation while accounting for important covariates including prior levels of internalizing and externalizing problems parsing out the independent contribution of neighborhood disadvantage. Lastly, the sample was characterized by immigrant groups of 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> generation youth and thus represents a more diverse population of Asian American youth.

## Conclusions

The sparse and mixed findings in the link between neighborhood context and Asian American adolescent mental health have led to a gap in the identification of environmental factors that contribute to internalizing behaviors in this fast-growing population. The current study applied the accumulation model and found empirical evidence for the longitudinal link between cumulative neighborhood disadvantage during late childhood and early adolescence and later mental health among Asian American adolescents. This link did not differ by sex or levels of co-ethnic density, indicating the pervasiveness of long-term exposure to neighborhood risk on adolescent mental health. Prevention efforts to curb adolescent internalizing problems may involve providing neighborhood-level institutional and social resources during a key developmental period of increasing autonomy and interaction with the neighborhood. Further exploration of cultural protective factors that mitigate the stressors resulting from neighborhood disadvantage is warranted to reduce the burden of mental health problems among Asian American adolescents.

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## Research Interests

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**Table 1**

Means, Standard Deviations, and Ranges of Variables (N = 177)

<b>Variable</b>	<b>N (%)</b>	<b>M (SD)</b>
Sex		
Female	80 (45%)	
Family SES		
Low income status	120 (68%)	
Generation Status		
1 <sup>st</sup>	98 (58%)	
2 <sup>nd</sup> or 3 <sup>rd</sup>	72 (42%)	
Internalizing (Age 10)		.09 (.13)
Internalizing (Age 15)		.78 (.31)
Co-ethnic Density		33.45% (17.52%)
Cumulative neighborhood Risk		4.17 (2.37)

**Table 2**

## Correlations Among Study Variables

	1	2	3	4	5	6
1. Sex (1 = Female)						
2. Family SES	.03					
3. Generation Status (1 <sup>st</sup> vs. 2 <sup>nd</sup> /3 <sup>rd</sup> )	-.08	-.52***				
4. Co-ethnic Density	-.06	-.02	.17*			
5. Neighborhood Risk	.04	.35***	-.13	.30***		
6. Internalizing (Age 10)	.11	-.02	.05	.19*	.07	
7. Internalizing (Age 15)	.12	.13	-.05	.10	.25***	.06

Note.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

**Table 3**

## Internalizing Behavior as Predicted by Study Variables

	Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE
Neighborhood Risk	.03*	.01	.03*	.01	.03	.01
Co-ethnic density	.001	.001	.001	.002	.001	.001
Sex (1 = Female)	.07	.05	.07	.05	.07	.05
Neighborhood Risk*Co-ethnic			.0003	.001		
Neighborhood Risk*Sex					.003	.02
Family SES	.03	.06	.04	.06	.03	.06
Generation Status	-.004	.05	-.003	.05	-.01	.05
Internalizing (Age 10)	.05	.18	.05	.18	.05	.18

Note.

\*  $p < .05$ .