



# The Cost of Academic Focus: Daily School Problems and Biopsychological Adjustment in Chinese American Families

Yang Qu<sup>1</sup> · Beiming Yang<sup>1</sup> · Eva H. Telzer<sup>2</sup>

Received: 21 February 2020 / Accepted: 6 May 2020 / Published online: 25 May 2020  
© Springer Science+Business Media, LLC, part of Springer Nature 2020

## Abstract

Stress from daily school problems may accumulate and eventually lead to mental health issues in both youth and their parents. With a strong cultural emphasis on school performance, Chinese American families may be particularly vulnerable to such stress. In the current research, Chinese American adolescents ( $N = 95$ ; Mean age = 13.7 years; 51% girls) and their parents completed daily diary reports of school problems and emotional well-being for 14 continuous days. Adolescents also provided four saliva samples per day for 4 consecutive days. Multilevel modeling analyses showed that youth's daily school problems predicted their lower happiness, higher distress, and higher total cortisol output above and beyond their emotional well-being and cortisol output the prior day. Moreover, there was a spillover effect such that youth's school problems also negatively predicted their parents' emotional well-being. Notably, the negative influence from school problems was moderated by children's cultural orientation, such that youth who were more oriented toward Chinese (vs. American) culture were more vulnerable to the school problems. Taken together, our results highlight the costs on biopsychological adjustment accompanying the academic focus in Chinese American youth and their parents.

**Keywords** Adolescents · Chinese American · Daily diary · School problems · Well-being

## Introduction

School-related problems are a major stressor that contributes to youth's mental health problems across the globe (e.g., USA: McCarty et al. 2008; UK: Putwain 2007; Germany: Eppelmann et al. 2016; China: Liu and Lu 2011; India: Jayanthi et al. 2015). Given that Chinese culture places a heightened emphasis on children's academic performance (Li 2016), Chinese American youth and their parents may be particularly vulnerable to the negative impact of school problems. Despite much attention to Chinese American youth's academic success, there is a lack of empirical research on possible negative consequences that Chinese American families may face by over-emphasizing academics. This leaves a concerning gap in the literature regarding a potential risk factor for Chinese

American families' well-being. No prior research has examined the potential daily impacts of youth's school problems on their and their parents' well-being, nor the role of culture in moderating the links between school problems and well-being. To address these issues, the current research examined the impact of school problems on both Chinese American adolescents' and parents' biopsychological adjustment using a daily diary approach.

## School Problems and Youth's Well-being

Daily school problems may have undesirable consequences on youth's well-being. Past research suggests that youth experiencing school-related stress are more vulnerable to both internalizing (e.g., anxiety and depression) and externalizing problems (e.g., aggression and conduct problems) (Maykel et al. 2018). Since stress during adolescence often carries into adulthood (Adkins et al. 2009), the negative impact of school-related stress on mental health can be long-lasting. Long-term stress-related problems may accumulate from daily stressors, such that the consequences of school-related stress may result from daily school problems. Although prior research with concurrent data suggests that school problems are associated with youth's psychosomatic

✉ Yang Qu  
yangqu@northwestern.edu

<sup>1</sup> Northwestern University, Evanston, IL, USA

<sup>2</sup> University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

symptoms (e.g., irritability, feeling nervous, and feeling low; Murberg and Bru 2004), no extant research has examined the links between youth's school problems and well-being at the daily level.

Besides potential negative impact on emotional well-being, daily school problems may also contribute to undesirable consequences on youth's physiological adjustment. Prior research suggests that stressors often lead to physiological changes such as greater total cortisol output (Stawski et al. 2013). Cortisol is an important hormonal product of the hypothalamic–pituitary–adrenal axis, one of the major physiological stress systems (Kirschbaum and Hellhammer 1989). Cortisol increases from its baseline level in response to stressors (Burke et al. 2005). On the daily level, cortisol increases in response to stressful and negative events (e.g., Doane et al. 2013; Michels et al. 2012). Despite growing interest in examining how daily events predict cortisol changes, no studies have investigated the link between school problems and cortisol output. School problems may act as a stressor for youth, leading to higher total cortisol output on days with more school problems.

### Spillover Effect on Parents' Well-being

These negative consequences may not be limited to adolescents themselves. Past studies with concurrent and longitudinal data show that youth's difficulties (e.g., developmental delays and frequent behavioral problems) are associated with parents' worse emotional well-being (e.g., lower parental self-efficacy and higher levels of stress, depression, and anxiety; Estes et al. 2009; Neece et al. 2012). These findings demonstrate how youth's problems may negatively influence their parents. Moreover, given that parents value their children's educational success (Symeou 2007; Vincent 2017) and tend to hold high expectations on their children's school performance (Wang and Benner 2014; Yamamoto and Holloway 2010), the problems that youth encounter at school (e.g., conduct problems and bad grades) may lead to disappointment and other negative feelings in parents. Therefore, on the daily level, youth's school problems could produce an interpersonal spillover effect on their parents, possibly contributing to worse emotional well-being.

### The Impact of School Problems on Chinese American Families

Asian American youth in general are high-achieving in school across primary, middle, and high school (de Brey et al. 2019), but also vulnerable to mental health issues, such as higher levels of internalizing problems and higher rates of suicidal attempts compared to their European American counterparts (Huang et al. 2012; Wyatt et al.

2015). It is not uncommon that emotional issues may come as a cost of academic success. Prior research has suggested that there may exist trade-offs in youth's academic and emotional functioning (Pomerantz et al. 2014). Indeed, high-achieving students tend to experience more academic stress (Banks and Smyth 2015). Moreover, compared to youth from other ethnic groups, Asian American youth report the lowest global self-esteem despite having the highest GPA (Chen and Graham 2018).

Chinese culture places a strong emphasis on learning, such that mastery of knowledge and the need to learn are viewed as a moral endeavor (Li 2016). Under the influence of such an academic focus, Chinese American youth's well-being may be particularly vulnerable to the negative impact of daily school problems. For youth from Chinese backgrounds, doing well in school is considered an important way to fulfill their family obligations (Chen and Wong 2014; Qu and Pomerantz 2015), which signals accomplishment of filial piety that Chinese culture highly values. As a consequence, school problems, which indicate youth not doing well in school, are likely to pose emotional burden on Chinese American youth. Moreover, the cultural emphasis on education may be particularly detrimental for Chinese American youth who grow up in bicultural contexts. In American culture, youth consider disengagement from school as increasingly normative among their peers as they move into early adolescence (Qu et al. 2016b). Given that such changes in peer norms seem contradictory to the emphasis on learning in Chinese culture, it may cause more challenges for Chinese American youth as they navigate the bicultural contexts.

The spillover effect of youth's school problem on parents' well-being may also be especially strong for Chinese American parents. In Chinese culture, parents consider academic assistance to children as a means to express love and affection, which is less common in Western cultures (Cheah et al. 2015). Moreover, they view their children's school accomplishments as a sign of optimal development (Ng et al. 2014; Qu et al. 2016a). As a consequence, Chinese parents' self-worth tends to be highly dependent on their children's school performance (Ng et al. 2013, 2014; Qu et al. 2016a). Chinese American adolescents' daily school problems may therefore be particularly stressful for their parents.

### Cultural Orientation Considerations

Cultural orientations, which refer to how much individuals value and engage in behaviors and traditions for a given culture, may moderate the link between school problems and youth's daily well-being. Since Chinese tradition emphasizes education (Li 2016), it is possible that Chinese American adolescents who are more oriented to Chinese

(vs. American) culture place more emphasis on school, and thereby are more affected by daily school problems. In contrast, since disengagement from school is viewed as normative during adolescence in American culture (Qu et al. 2016b), Chinese American adolescents who are more oriented to American (vs. Chinese) culture may place less emphasis on school, and thus are less likely to be affected by problems related to school. Therefore, youth's cultural orientation could moderate the daily association between school problems and their biopsychological adjustment. This moderation effect may partially explain why Asian American youth who are the more American-aculturated experience less mental health problems (Hwang and Ting 2008; Yeh 2003).

In contrast, Chinese American parents' cultural orientation may be less likely to moderate the daily association between their children's school problems and their own emotional well-being. Prior research suggests that most Chinese immigrant parents are highly oriented to the culture that they grew up in and thus strongly endorse Chinese relative to American values and traditions (Chen et al. 2014). Not surprisingly, among first-generation Chinese American immigrant families, parents tend to be more oriented to Chinese culture and have less variations in their cultural orientation compared to their children (Costigan and Dokis 2006). Therefore, the moderating role of cultural orientation could be less significant for Chinese American parents than for their children.

## Current Study

The current study was guided by three goals. The first goal was to examine how daily school problems related to Chinese American adolescents' biopsychological adjustment. It was hypothesized that daily school problems among Chinese American adolescents may contribute to lower daily happiness as well as greater distress and cortisol levels. The second goal of the current research was to investigate the spillover effect of adolescents' school problems on parents' emotional well-being. It was anticipated that Chinese American adolescents' daily school problems may also have an undesirable impact on their parents' emotional well-being. Finally, the third goal was to explore the potential moderating role of cultural orientation in the daily association between school problems and parents' and adolescents' well-being. It was hypothesized that Chinese American adolescents who are more oriented to Chinese (vs. American) culture are more vulnerable to the negative effects of school problems on their biopsychological adjustment.

To test these hypotheses, the present study adopted a daily diary approach. Adolescents from Chinese immigrant

families completed daily diaries for 14 days, reporting on their school problems and positive and negative affect before going to bed each night. During the same 14-day period, parents also reported their daily positive and negative affect. Adolescents also provided saliva samples four times per day on four days of the daily diary. The daily diary approach is particularly useful for studying the associations between school problems and youth's and their parents' well-being. First, the occurrences of school problems are best captured at the daily level, because youth's reports of daily experiences are more accurate and reliable compared to data collected from a single retrospective questionnaire (Bolger et al. 2003). Second, by adopting the daily diary approach, the present study can examine whether youth's school problems occurring on a given day are associated with their biopsychological outcomes on the same day. Because the data were collected among the same families over the course of two weeks, using within-subject analyses, daily associations between school problems and emotional well-being can be examined while controlling for participants' emotional well-being the prior day. In this way, the present study can answer the within-family daily-level research questions (e.g., does an adolescent's daily school problems predict his/her parent's daily well-being on the same day?) without being influenced by confounding factors that between-subject analyses may present.

## Methods

### Participants

The sample consisted of 95 Chinese American parent-child dyads. Adolescents were between 11 and 18 years (Mean age = 13.7 years,  $SD = 1.38$  years), and were evenly divided by sex (48 girls, 47 boys). The participating parent was the primary caregiver of the adolescent, with 70 biological mothers and 25 biological fathers. Twenty adolescents were first-generation immigrants, coming to the United States at an average age of 6.56 years, and 75 adolescents were born in the United States (i.e., second generation). English was spoken in every home, and Chinese was spoken in 97% of the homes. Participants were given the options to complete either an English or a Chinese version of the questionnaire. All the adolescents chose to complete the questionnaire in English, while 36.8% of parents chose to complete the questionnaire in English. In this sample, 82% of the families reported to have a total gross annual household income greater than \$90,000. Although most studies on Chinese American families took place in diverse metropolitan areas and ethnic enclaves, the present study focused on the unique experiences of families living in small, mostly homogenous Midwestern towns. Participants were recruited via flyers,

newsletters, word of mouth, or face-to-face introduction from middle and high schools in rural and suburban areas in Champaign, Illinois, and Ann Arbor, Michigan.

## Procedure

Researchers visited the home of participating families. Adolescents and their parents each completed a questionnaire and were then given a set of daily diary checklists to fill out before bedtime for the next 14 days. The days included both weekdays and weekends. Such a two-week period has been widely used in studies adopting the daily diary method (e.g., Telzer and Fuligni 2009; Wang and Yip *in press*; Yip and Fuligni 2002; Zhang and Zheng 2017). Participants were given the options to complete the daily diary on paper or online. For participants who chose to complete checklists on paper, 14 manila envelopes and an electric time stamper were provided to record the time of checklist completion. Each night, participants were instructed to put the completed checklists in an envelope, seal the envelope, and stamp the time with the electric time stamper. The time stamper is a small device that imprints the current date and time and is programmed with a security code so that the correct date and time cannot be changed (Dymo Corporation, Stamford, CT). For participants who chose to complete the checklists online, a link to each checklist was emailed to participants, and the completion time was recorded automatically via the survey website. The daily diary checklists were three-pages long and took about 5–10 min to complete. Adolescents were also provided with saliva collection kits to provide saliva on days 2–5 of the 14-day diaries. Saliva collection of a consecutive 3–4 days has been the practice commonly used in past studies (e.g., Armstrong-Carter et al. *in press*; Heissel et al. 2018; Sladek and Doane 2015; Stawski et al. 2013). Researchers texted the participants four times a day for the 4 days of saliva collection, and once daily on other days of data collection to remind them to complete the saliva samples and daily checklists. Upon completion, researchers picked up the materials and gave participants \$50 for payment. All procedures were approved by the Institutional Review Board.

## Measures

### Daily diary measures

**Daily school problems** Adolescents indicated their problems at school for 2 weeks. Each day, adolescents indicated whether they had experienced any of the following school problems: “had difficulty getting to school on time”, “were late for class”, “fell asleep during class”, “were absent from school”, and “skipped or cut a class”. Total

school problems were summed each day, with greater score indicating more daily school problems on each day for each participant ( $M = 0.16$ ,  $SD = 0.45$ , range = 0–3). Overall, 61% of adolescents reported at least one incident of school problems across the 14 days such that 22% reported one incident, and 39% reported two or more incidents. On any given day, the percentage of adolescents who reported at least one incident of school problems ranged from 5 to 22%. The rate of school problems was higher or similar to prior research examining other low base-rate negative daily events (e.g., peer victimization and racial discrimination; Espinoza et al. 2013; Huynh and Fuligni 2010; Wang and Yip *in press*).

**Adolescent daily emotional well-being** Each evening during the 2-week period, adolescents’ *daily distress* was assessed with items adapted from the Profile of Mood States (POMS; McNair et al. 1971), a widely used measure in previous daily diary studies of stress and emotional well-being (Bolger and Zuckerman 1995; Fuligni et al. 2009). Adolescents used a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*) to indicate the extent to which they felt distress (items: “sad”, “hopeless”, “embarrassed”, “on edge”, “unable to concentrate”, “stressed”, “nervous”). The mean of the items was taken for each day, with higher numbers representing greater daily distress ( $\alpha = 0.87$ ). Adolescents’ *daily happiness* was assessed with items adapted from the POMS (Kiang et al. 2006). Adolescents used a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*) to indicate the extent to which they felt happiness (items: “joyful”, “happy”, “calm”, “enthusiastic”, “excited”). The mean of the items was taken for each day, with higher numbers representing greater daily happiness ( $\alpha = 0.85$ ).

**Parent daily emotional well-being** Each evening during the 2-week period, parents’ *daily distress* and *daily happiness* were assessed using the same items as those for adolescents’ daily emotional well-being. The mean of the distress ( $\alpha = 0.69$ ) and happiness ( $\alpha = 0.90$ ) items was taken separately for each day, with higher numbers representing greater daily distress and happiness.

### Salivary cortisol

Saliva samples were collected four times a day at designated times for four consecutive days from Day 2 to Day 5: immediately upon wake-up (sample 1), 30 min after wake-up (sample 2), 5 p.m. or before dinner (sample 3), and 8 p.m. or before bed-time (sample 4). Same with the daily checklists, saliva samples were collected on both weekdays and weekends depending on when days 2–5 occurred. Adolescents were instructed to provide their saliva by

passively drooling into the tube. They were instructed not to eat, drink, or brush their teeth 30 min before collecting samples. They used the time stamper to stamp the time of collection on a collection sheet, and put the saliva into the fridge. Saliva samples were picked up by researchers, immediately frozen at  $-80^{\circ}\text{C}$ , and then shipped on dry ice to Dresden Lab Services, Germany to be assayed using high-sensitivity chemiluminescence-immunoassays (IBL International, Hamburg, Germany). The inter-assay coefficient of cortisol variation was below 8%. A total of 88.4% of participants ( $n = 84$ ) provided at least one saliva sample and 86.3% ( $n = 82$ ) provided all 4 saliva samples for at least a day.

There were no differences in key variables between youth who provided saliva and those who did not,  $F_s < 1.58$ ,  $p_s > 0.21$ . To handle the missing data, analyses were conducted using HLM8 with 10 imputed data sets (Raudenbush et al. 2019). HLM8 generates and analyses multiply imputed data sets from incomplete data. The program automatically searches the data to identify which variables have missing values and then estimates a multivariate hierarchical linear model in which all variables having missed values are regressed on all variables having complete data. The program then uses the resulting parameter estimates to generate multiple imputed data sets (e.g., 10 imputed data sets in the present study). Each of the data sets is then analyzed and results are combined based on Rubin's combination rules (Rubin 1987, 1996).

For analysis, the trapezoid formula was used to calculate the AUC (i.e., area under the curve) with respect to ground as the total daily cortisol output (Pruessner et al. 2003). AUC was calculated for days where participants had all four cortisol samples across the day. Saliva samples with cortisol values over 60 nmol/L were removed to reduce the effects of outliers (Stawski et al. 2013). The following saliva samples were flagged: (1) if participants reported more than 60 min ( $n = 7$ ) or less than 15 min ( $n = 23$ ) between collecting sample 1 and sample 2; (2) if the increase in cortisol value between sample 2 and sample 3 was more than 10 nmol/L ( $n = 6$ ); (3) if participants had been awake for more than 20 h ( $n = 3$ ) or less than 12 h ( $n = 19$ ). The exclusions of these flagged groups were tested separately as well as jointly, and the results were not changed. Therefore, these flagged samples were not excluded from the final analyses.

### Questionnaire measures

**Cultural orientation** Adolescents reported on their cultural orientation using items adapted from the Acculturation Rating Scale for Mexican Americans-II (ARSMA-II) (Cuellar et al. 1995). On a 5-point scale (1 = *not at all*, 5 = *extremely*), adolescents indicated how much they enjoy each of the seven activities (e.g., “listening to Chinese

music”, “associating with Chinese people”, and “celebrating holidays according to Chinese tradition (for example, Spring Festival, Mid-Autumn Festival, etc.)”). Their responses were averaged, with higher numbers representing greater orientation to Chinese culture ( $\alpha = 0.83$ ). The same seven items were modified to assess their orientation to American culture (e.g., “listening to American music”, “associating with American people”, and “celebrating holidays according to Anglo American tradition (for example, Fourth of July, Thanksgiving, etc.)”). Their responses were averaged, with higher numbers representing greater orientation to American culture ( $\alpha = 0.78$ ). Parents reported on their orientation to Chinese and American culture using the same 14 items as those for adolescents (orientation to Chinese culture,  $\alpha = 0.82$ ; orientation to American culture,  $\alpha = 0.89$ ).

To characterize participants' orientation to Chinese culture relative to American culture, the difference between orientation to Chinese and American culture was taken, with positive scores indicating adolescents' greater orientation toward Chinese (vs. American) culture, and negative scores indicating adolescents' greater orientation toward American (vs. Chinese) culture. The calculation of a difference score has been widely used to capture cultural orientation to one culture relative to another (e.g., Parke et al. 2004; Schofield et al. 2008; Wheeler et al. 2014). This method is particularly useful in the present study, because Chinese American youth are exposed to a bicultural context and may simultaneously show orientations toward both Chinese and American cultures. Therefore, the difference score between orientations of two cultures can better capture individual differences in the extent to which youth prioritize one cultural orientation over the other.

## Results

### Descriptive Analyses

Table 1 shows descriptive statistics and the Pearson correlations among variables. For the daily level variables, averages were taken across the 14 days. The only significant bivariate correlations to emerge include a negative association between higher cortisol and lower happiness, as well as a positive association between adolescent and parent cultural orientation. Compared with boys, girls showed greater daily cortisol,  $t = 2.50$ ,  $p = 0.01$ , and reported greater distress,  $t = 1.90$ ,  $p = 0.06$ , as well as less orientation to American culture (vs. Chinese culture),  $t = 2.12$ ,  $p = 0.04$ . On average, adolescents were more oriented to American culture (vs. Chinese culture),  $t = 7.62$ ,  $p < 0.001$ , whereas parents were more oriented to Chinese culture (vs. American culture),  $t = 3.42$ ,  $p = 0.001$ .



**Table 1** Descriptive statistics and correlations of variables

	1	2	3	4	5	6	7
1. Adolescents' cortisol (AUC)	–						
2. Adolescents' distress	0.13	–					
3. Adolescents' happiness	–0.24*	–0.17	–				
4. Parents' distress	–0.07	0.07	–0.09	–			
5. Parents' happiness	0.07	–0.12	0.19 <sup>†</sup>	–0.24*	–		
6. Adolescents' cultural orientation	0.21	0.08	–0.15	0.05	–0.12	–	
7. Parents' cultural orientation	0.05	–0.07	–0.05	0.01	–0.13	0.28**	–
Mean	193.95	1.61	2.96	1.18	2.88	–0.77	0.35
SD	70.95	0.61	0.72	0.22	0.81	0.99	0.99

For variables 1–5, the measures indicate averages across the 14 days

<sup>†</sup> $p < 0.10$ ; \* $p < 0.05$ ; \*\* $p < 0.01$

**Table 2** Hierarchical linear models predicting daily child and parent well-being and child cortisol by school problems

Daily level	Child			Parent	
	Cortisol (AUC)	Distress	Happiness	Distress	Happiness
Intercept	167.96 (8.71)***	0.98 (0.07)***	2.01 (0.12)***	0.93 (0.05)***	1.47 (0.11)***
School problems	38.18 (6.71)***	0.07 (0.03)*	–0.07 (0.03)*	0.04 (0.02)*	–0.12 (0.04)**
Outcome on previous day	0.10 (0.03)**	0.37 (0.04)***	0.32 (0.03)***	0.20 (0.04)***	0.49 (0.03)***

The unstandardized estimates ( $b$  and  $SE$ ) of the daily-level associations between school problems and well-being are presented

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

## Analysis Plan

Three sets of analyses were conducted. The first set of analyses examined the associations between school problems and adolescents' emotional well-being as well as the total cortisol output (i.e., AUC). The second set of analyses investigated whether adolescents' school problems spilled over to affect parents' emotional well-being. Importantly, the present study tested whether school problems predicted parents' emotional well-being above and beyond their children's emotional well-being. The purpose of these analyses was to examine the possibility that the link between adolescents' school problems and parents' emotional well-being was driven by adolescents' emotional well-being. The third set of analyses was to examine whether cultural orientation moderates the association between daily school problems and adolescents' and parents' emotional well-being.

## Daily School Problems and Adolescents' Biopsychological Adjustment

The daily-level analyses were conducted with hierarchical linear modeling (HLM8; Raudenbush et al. 2019), which was designed to analyze nested data (i.e., daily-level data

nested within individuals). The first aim of the current research was to investigate the effect of Chinese American adolescents' school problems on their own emotional well-being and total cortisol output. Adolescents' daily well-being (i.e., distress, happiness, cortisol) was predicted by school problems that the adolescents experienced that day as well as their well-being the prior day. The following equation was estimated separately for distress, happiness, and cortisol:

Level 1 model:

$$\text{well-being}_{ij} = b_{0j} + b_{1j}(\text{school problems}) + b_{2j}(\text{well-being}_{t-1}) + e_{ij} \quad (1)$$

Adolescents' well-being (i.e., distress, happiness, cortisol) on a given day ( $i$ ) for a particular adolescent ( $j$ ) was modeled by each individual's average well-being ( $b_{0j}$ ) and school problems that day ( $b_{1j}$ ). Prior-day well-being ( $b_{2j}$ ) was included to control for the effects of well-being from the previous day and to capture the unique effect of school problems. The error term in the equation represents unexplained variance ( $e_{ij}$ ).

As shown in Table 2, on days when adolescents experienced more school problems, they reported greater distress that day even after controlling for distress the

**Table 3** Estimates of hierarchical linear models predicting child cortisol and well-being moderated by cultural orientation

Daily level individual level	Child		
	Cortisol (AUC) <i>b</i> ( <i>SE</i> )	Distress <i>b</i> ( <i>SE</i> )	Happiness <i>b</i> ( <i>SE</i> )
Intercept	174.14 (9.84)***	1.00 (0.07)***	1.97 (0.12)***
Chinese vs. American cultural orientation	8.96 (6.36)	0.02 (0.04)	−0.07 (0.05)
School problems	38.07 (6.85)***	0.09 (0.03)***	−0.08 (0.03)*
Chinese vs. American cultural orientation	9.95 (4.85)*	0.04 (0.02)*	−0.01 (0.03)
Outcome on previous day	0.11 (0.03)**	0.37 (0.04)***	0.32 (0.03)***

\* $p < 0.05$ ; \*\*\* $p < 0.001$ The unstandardized estimates (*b* and *SE*) of hierarchical linear models are presented

prior day. Similarly, school problems significantly predicted less happiness that day even after controlling for happiness the prior day. Finally, school problems predicted greater cortisol, while controlling for prior day cortisol.

### Daily School Problems and Parents' Emotional Well-Being

The second aim of the current research was to investigate the spillover effect of Chinese American adolescents' school problems on their parents' emotional well-being. Similar to Eq. (1), parents' emotional well-being (i.e., distress and happiness) was predicted by adolescents' school problems that day as well as parents' emotional well-being the prior day. As shown in Table 2, on days when adolescents experienced more school problems, their parents reported greater distress that day after controlling for parents' distress the prior day. Similarly, adolescents' school problems were significantly associated with parents' lower happiness that day after controlling for parents' happiness the prior day.

To rule out the possibility that the link between adolescents' school problems and parents' emotional well-being was driven by adolescents' emotional well-being, the present study further examined whether adolescents' school problems play a role in parents' emotional well-being above and beyond adolescents' emotional well-being that day. To this end, adolescents' emotional well-being was added into the equation, such that parents' emotional well-being was predicted by adolescents' school problems, adolescents' emotional well-being that day, as well as parents' emotional well-being the prior day. Adolescents' school problems still significantly predicted higher levels of parental distress ( $b = 0.04$ ,  $SE = 0.02$ ,  $p < 0.05$ ), and lower parental happiness ( $b = -0.12$ ,  $SE = 0.04$ ,  $p < 0.01$ ), after controlling for adolescents' distress/happiness that day and parents' distress/happiness the prior day, suggesting that even after taking into account adolescents' emotional well-being that day, adolescents'

school problems are still associated with parents' emotional well-being.

### The Moderating Role of Cultural Orientation in the Daily Associations Between School Problems and Biopsychological Adjustment

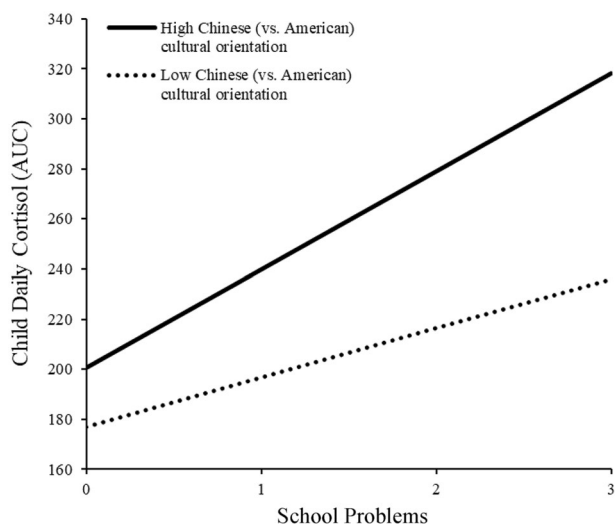
The third aim examined whether the daily association between school problems and adolescents' and parents' well-being was moderated by cultural orientation. The difference score between orientation to Chinese and American culture was taken, with greater scores indicating greater orientation toward Chinese (vs. American) culture. The models included the same daily-level equation described in Eq. (1) with the inclusion of the following individual level equations:

Level 2 model:

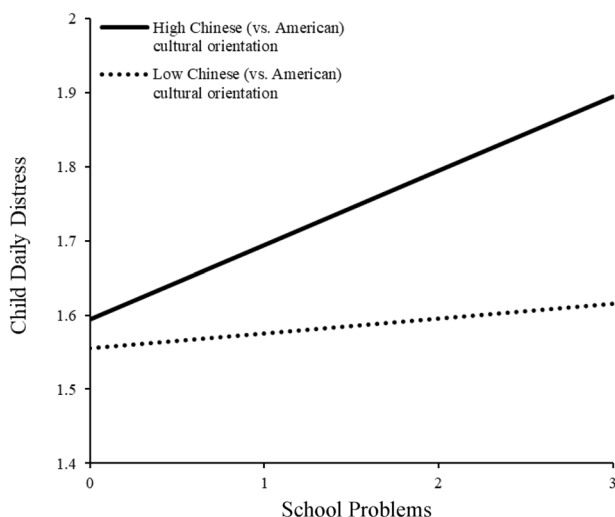
$$b_{0j} = c_{00} + c_{00}(\text{Chinese vs. American cultural orientation}) + u_{0j} \quad (2)$$

$$b_{1j} = c_{10} + c_{11}(\text{Chinese vs. American cultural orientation}) + u_{1j} \quad (3)$$

As shown in Table 3, the associations between school problems and distress and cortisol were moderated by adolescents' cultural orientation. To probe this effect, the simple slopes for adolescents with high (i.e., 1 SD above the mean) and low (i.e., 1 SD below the mean) cultural orientation were plotted. Adolescents who showed greater orientation to Chinese (vs. American) culture showed greater daily cortisol (Fig. 1),  $b = 39.22$ ,  $SE = 8.01$ ,  $p < 0.001$ , and reported greater distress (Fig. 2),  $b = 0.10$ ,  $SE = 0.03$ ,  $p < 0.001$ , on days when they experienced more school problems. However, adolescents who showed lower orientation to Chinese (vs. American) culture did not show greater daily cortisol (Fig. 1),  $b = 19.65$ ,  $SE = 12.14$ ,  $p > 0.12$ , or greater distress (Fig. 2),  $b = 0.02$ ,  $SE = 0.04$ ,  $p > 0.56$ , on the days when they experienced more school problems. Parents' cultural orientation did not moderate the link between adolescents' school problems and parents' well-being, who on average reported greater orientation to Chinese (vs. American) culture.



**Fig. 1** Chinese American adolescents' cultural orientation moderates the daily association between school problems and cortisol (AUC). "High Chinese (vs. American) cultural orientation" refers to adolescents 1 SD above the mean, and "Low Chinese (vs. American) cultural orientation" refers to adolescents 1 SD below the mean



**Fig. 2** Chinese American adolescents' cultural orientation moderates the daily association between school problems and distress. "High Chinese (vs. American) cultural orientation" refers to adolescents 1 SD above the mean, and "Low Chinese (vs. American) cultural orientation" refers to adolescents 1 SD below the mean

## Supplemental Analyses

A final set of analyses were conducted to rule out potential confounds across the three central sets of analyses. Given that girls showed greater daily cortisol and reported greater distress compared to boys, additional analyses were conducted to examine potential gender differences. Boys and girls did not differ in their experience of daily school problems,  $b = -0.02$ ,  $SE = 0.05$ ,  $p = 0.72$ . More importantly,

there were no gender differences in the daily associations between school problems and happiness,  $b = 0.04$ ,  $SE = 0.07$ ,  $p = 0.59$ , between school problems and distress,  $b = -0.02$ ,  $SE = 0.06$ ,  $p = 0.72$ , and between school problems and cortisol,  $b = 6.96$ ,  $SE = 34.40$ ,  $p = 0.84$ . Moreover, family income did not moderate the association between daily school problems and youth outcomes (i.e., happiness, distress, and cortisol level),  $bs < -0.02$ ,  $SEs < 0.02$ ,  $ps > 0.17$ , or between daily school problems and parent outcomes (i.e., happiness and distress),  $bs < 0.01$ ,  $SEs < 0.03$ ,  $ps > 0.78$ .

To ensure the robustness of the findings, the present study also controlled for covariates in the Level 1 model (daily level: week of the study) and Level 2 model (individual level: child sex, family income, child birthplace). Inclusion of these covariates in the three sets of central analyses did not meaningfully change the size or significance of the findings reported above. Specifically, daily school problems were still associated with youth's lower happiness, greater distress, and greater cortisol ( $bs > 0.06$ ,  $SEs < 0.03$ ,  $ps < 0.05$ ), as well as parents' lower happiness and greater distress ( $bs > 0.04$ ,  $SEs < 0.02$ ,  $ps < 0.05$ ). Youth's greater orientation toward Chinese (vs. American) culture moderated the links between daily school problems and youth's distress and cortisol ( $bs > 0.04$ ,  $SEs < 0.02$ ,  $ps < 0.05$ ).

## Discussion

School-related stress is widely considered a major cause of youth's mental health problems (Maykel et al. 2018). The long-term negative impact of school-related stress on youth's mental health may be accumulated from stressful daily events, for instance, school problems. Given that Chinese values place a strong emphasis on children's school performance, Chinese American youth and their parents may be particularly vulnerable to the negative effect of daily school problems. In the current research, the results suggest that Chinese American adolescents' daily school problems are not only negatively associated with their own daily biopsychological adjustment, but also predicted their parents' dampened daily well-being. Notably, not all Chinese American youth were vulnerable to the negative emotional impact of daily school problems. Only for youth who were more oriented toward Chinese (vs. American) culture was daily school problems associated with greater distress and cortisol.

## Consequences of School Problems on Chinese American Families

The current study found that daily school problems predicted Chinese American adolescents' higher distress and



lower happiness, controlling for their prior-day emotional well-being, as well as higher daily total cortisol output (i.e., AUC), controlling for their prior-day cortisol level. The higher cortisol output confirmed results from the self-reported survey measure (i.e., higher reported daily distress), since cortisol is a stress-related hormone that rises from baseline levels following the onset of a stressor (Burke et al. 2005; McEwen 1998). These results suggest that school problems are a significant daily stressor for Chinese American adolescents. Moving beyond prior research on concurrent association between youth's school problems and psychological symptoms (Murberg and Bru 2004), the current research demonstrates daily links between youth's school problems and their well-being. The findings expand prior knowledge on school problems in Chinese American families, suggesting that such problems are associated with worse biopsychological adjustment on the daily level in the similar way as stressful and negative life events (e.g., Doane et al. 2013; Michels et al. 2012). It is important to note that in line with prior research showing that Asian American youth show a higher or similar daily cortisol output compared to youth from other ethnicities (Deer et al. 2018), the cortisol level of Chinese American youth in the present study shows a similar pattern when comparing with the cortisol levels of African American and Mexican American youth in prior research (Mrug et al. 2016; Zeiders et al. 2012). This suggests the potential vulnerability of Chinese American youth and highlights the importance to identify risk factors that may undermine Chinese American youth's well-being. Due to the heightened emphasis on school performance in Chinese culture, adolescents from Chinese backgrounds tend to consider school success as a means of fulfilling responsibilities to their parents (Chen and Wong 2014; Qu and Pomerantz 2015). Therefore, Chinese American adolescents may consider school problems a sign of irresponsibility, and thus feel stressed when these problems occur. Another possible factor may be the societal expectation associated with the "high-achieving" stereotypes. Under such stereotypes, Chinese American youth may be expected to perform well in school (Wong 2015). Therefore, school problems are a contradiction to this societal expectation, which may lead Chinese American adolescents to experience more stress when they encounter them (Cokley et al. 2013; Lee et al. 2009). Future research should examine whether the pressure of "high-achieving" stereotypes undermines Chinese American youth's well-being.

Moreover, Chinese American adolescents' daily school problems predicted their parents' higher daily distress and lower daily happiness, controlling for their prior-day emotional well-being. More importantly, follow-up analyses were conducted to examine whether the link between

school problems and parents' well-being was driven by youth's well-being. The effects of school problems on parents' well-being held above and beyond adolescents' well-being that day, such that controlling for their children's well-being did not meaningfully change the results. These results suggest a spillover effect of adolescents' school problems on their parents' higher distress and lower happiness that is not accounted for by youth's higher distress and lower happiness. Due to the academic focus in Chinese culture, parents from Chinese backgrounds are likely to consider their children's education as a major personal responsibility (Ng et al. 2014). When children encounter school problems, Chinese American parents may feel that it is a sign of their unsuccessful parenting and a matter of their responsibility, and consequently feel stressed and unhappy. Although the findings ruled out the possibility that the link between youth's school problems and parents' well-being was driven by youth's well-being, future research should evaluate other potential mechanisms. For example, child disclosure to parents may serve as a potential mechanism, such that youth tell their parents about their experiences in school each day, and knowledge of school problems results in parental distress.

### The Moderating Role of Cultural Orientation

Notably, the more oriented toward Chinese culture, the more vulnerable Chinese American adolescents were to the negative emotional toll of school problems. Adolescents who reported greater orientation to Chinese (vs. American) culture had higher daily total cortisol output and reported greater daily distress on days when they encountered more problems at school. Since Chinese (vs. American) culture places a greater emphasis on school and learning (Li 2016), when Chinese American adolescents are more oriented toward Chinese culture, they may put more emphasis on school, and thus are more likely to be influenced by school problems. This moderation effect highlights the individual differences within the Chinese American population. For example, Chinese American adolescents who were more oriented to American culture were buffered from the negative emotional toll of school problems. However, the moderating role of cultural orientation was not significant for the effect of school problems on youth's happiness, such that encountering school problems decreased youth's daily happiness regardless of their cultural orientation. This implies that the moderating role of cultural orientation may not apply to positive affect, instead the moderation effect may be specific to negative affect and stress-related biological responses. Although greater orientation to American culture buffers youth from greater distress and biological

changes, school problems are unpleasant in nature, which may lead to decreased happiness regardless of cultural orientation. Given the focus on the role of cultural orientation, the present study only assesses youth's and parents' orientation toward Chinese vs. American culture, but not other factors that may also moderate the link between school problems and well-being. For example, the negative consequences of school problems may be specific for those who place strong emphasis on learning. Therefore, future research should also assess other variables that may moderate the link between school problems and well-being along with cultural orientation and disentangle the unique role of each variable.

Moreover, it is important to note that the present study did not find similar moderation effects for Chinese American parents, such that parents were negatively affected by their child's school problems regardless of their cultural orientation. A possible explanation is their overall greater orientation toward Chinese culture. Chinese American parents on average reported greater orientation to Chinese (vs. American) culture than did their children, which is consistent with reports from prior research (Costigan and Dokis 2006). Previous studies suggest that, compared to Chinese American children, Chinese American parents are more influenced by Chinese culture and tend to endorse Chinese values (Chen et al. 2014; Lim et al. 2008). Therefore, given the strong emphasis on school performance in Chinese culture, Chinese American parents are likely to be affected by their children's daily school problems despite variations in their cultural orientation.

### Limitations and Future Directions

There are several limitations in the current study that point to directions for future research. First, the sample size is relatively small. However, the results in the present study showed a consistent pattern across a number of outcomes, suggesting the robustness of the findings. For example, consistent results across multiple variables (i.e., lower happiness, higher distress, and higher total cortisol output) were found with regard to the effects of school problems on youth's biopsychological adjustment. The consistency between these variables is in line with prior research, which demonstrates that cortisol level is positively associated with adolescents' distress and negatively associated with adolescents' happiness (Dambrun et al. 2012). Moreover, the relation between school problems and emotional well-being is consistent with the results from previous concurrent research using a larger sample size (Murberg and Bru 2004). It is important to note that, in comparison with prior research with larger sample sizes at a single time point (Murberg and Bru 2004), the sample consists of 14 data

points per person, which increases the statistical power despite its smaller size. Nevertheless, future research can use larger samples to examine the effect of daily school problems on children's and their parents' well-being. Given the correlational nature of the study, caution should be taken when interpreting the findings. It is possible that youth with more psychological problems and greater stress are struggling more at school. Yet, the daily analyses, which examine associations within youth, suggest that these between-person effects do not account for the results. Nonetheless, longitudinal research that unpacks these associations over time may better capture the direction of these effects.

Second, given the key purpose of this study was to examine the negative consequence of academic focus, the items assessing school problems mainly captured academic related problems. However, it remains unknown if non-academic problems in school, such as social problems with peers and teachers, would have similar or differential effects on Chinese American adolescents and parents. Prior research has demonstrated the negative effect of social problems in school on adolescents' psychological well-being (Zych et al. 2017). Therefore, it is important for future research to assess a broader range of school problems and compare the impact of different types of school problems (academic related problems vs. social related problems) on Chinese American families.

Third, the current research only examined short-term effects of school problems on youth's biopsychological adjustment, and thus whether such short-term effects lead to long-term influences on mental health is yet unknown. Prior longitudinal studies in adults demonstrate that daily stressors (e.g., an argument with friends, a broken appliance, and a negative comment on social network) have long-term influence on mental health problems as well as physical health problems (Charles et al. 2013; Piazza et al. 2013). It is likely that Asian American youth's higher frequencies of mental health issues compared to their European American counterparts (Huang et al. 2012; Wyatt et al. 2015) result from cumulative daily stressors on their biopsychological adjustment. Therefore, a key direction for future research will be to examine the long-term effects of daily school problems on Asian American youth's mental health using a combination of daily diary and longitudinal methods.

Finally, due to the importance of learning in Chinese culture, the current research focuses on the influence of school problems on biopsychological adjustment in Chinese American families. Therefore, it is still unknown whether the negative impact of daily school problems on biopsychological adjustment also applies to youth from other ethnic backgrounds. It is important for future research to include more diverse populations to examine whether these

developmental processes are universal or culturally specific. As indicated in the present research, given that Chinese American youth who were less oriented toward Chinese (vs. American) culture were less vulnerable to the negative impact of school problems on biopsychological adjustment, the negative impact of school problems on youth's biopsychological adjustment may be less likely to apply to youth from other ethnic backgrounds. Future studies could examine the influence of school problems in families from different ethnic backgrounds.

## Conclusion

Stress accumulated from daily school problems may eventually lead to serious mental health problems. As Chinese culture places a strong emphasis on children's school performance, Chinese American families' well-being may be especially vulnerable to difficulties that youth encounter at school. No prior research has examined the biopsychological consequences of school problems in Chinese American families, which represents a concerning gap because it overlooks a key factor that may contribute to psychological well-being of Chinese American adolescents and parents. Using a daily diary approach, the current study suggests that given the highlighted cultural emphasis on academics, Chinese American adolescents' school problems not only influence their own biopsychological adjustment, but also have a spillover effect on their parents' emotional well-being. Moreover, adolescents' greater orientation to Chinese (vs. American) culture makes them more vulnerable to the impact of school problems on biopsychological adjustment, which calls attention to the individual differences within the Chinese American population. Taken together, the findings highlight the biopsychological costs accompanying a strong emphasis on school performance in Chinese American families, which broadens the knowledge on potential risk factors underlying not only youth but also their parents' well-being. Interventions aiming at preventing mental health problems in Chinese American families should take into consideration the role of school problems and alleviate the accompanying negative consequences.

**Acknowledgements** The authors would like to thank Cynthia X. Yuen for her vital contribution to this study. We also appreciate the constructive comments on an earlier version of this article provided by members of Culture and Adolescent Development Lab at Northwestern University.

**Authors' Contributions** Y.Q. was involved in developing the hypotheses motivating the data analyses, performed the statistical analyses, interpreted the results, and drafted the manuscript; B.Y. was involved in analyses of the data, interpretation of the results, and drafted the manuscript; E.H.T. participated in the study design, oversaw the data

collection, was involved in the interpretation of the results, and revised the manuscript. All authors read and approved the final manuscript.

**Funding** This research was supported by an Immigrant Health Transitions Initiative Seed Grant, University of Illinois at Urbana Champaign, the National Institutes of Health (R01DA039923), and the National Science Foundation (BCS 1539651).

**Data Sharing and Declaration** The datasets generated and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**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.

**Informed Consent** Consent forms were obtained from all participants included in the study.

**Publisher's note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

## References

- Adkins, D. E., Wang, V., Dupre, M. E., Van den Oord, E. J., & Elder, G. H. Jr (2009). Structure and stress: trajectories of depressive symptoms across adolescence and young adulthood. *Social Forces*, 88(1), 31–60. <https://doi.org/10.1353/sof.0238>.
- Armstrong-Carter, E., Ivory, S., Lin, L. C., Muscatell, K. A., & Telzer, E. H. (in press). Role fulfillment mediates the association between daily family assistance and cortisol awakening response in adolescents. *Child Development*. <https://doi.org/10.1111/cdev.13213>.
- Banks, J., & Smyth, E. (2015). 'Your whole life depends on it': academic stress and high-stakes testing in Ireland. *Journal of Youth Studies*, 18(5), 598–616. <https://doi.org/10.1080/13676261.2014.992317>.
- Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress process. *Journal of Personality and Social Psychology*, 69(5), 890–902. <https://doi.org/10.1037//0022-3514.69.5.890>.
- Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: capturing life as it is lived. *Annual Review of Psychology*, 54(1), 579–616. <https://doi.org/10.1146/annurev.psych.54.101601.145030>.
- Burke, H. M., Davis, M. C., Otte, C., & Mohr, D. C. (2005). Depression and cortisol responses to psychological stress: a meta-analysis. *Psychoneuroendocrinology*, 30(9), 846–856. <https://doi.org/10.1016/j.psyneuen.2005.02.010>.
- Charles, S. T., Piazza, J. R., Mogle, J., Sliwinski, M. J., & Almeida, D. M. (2013). The wear and tear of daily stressors on mental health. *Psychological Science*, 24(5), 733–741. <https://doi.org/10.1177/0956797612462222>.
- Cheah, C. S., Li, J., Zhou, N., Yamamoto, Y., & Leung, C. Y. (2015). Understanding Chinese immigrant and European American mothers' expressions of warmth. *Developmental Psychology*, 51(12), 1802–1811. <https://doi.org/10.1037/a0039855>.

- Chen, S. H., Hua, M., Zhou, Q., Tao, A., Lee, E. H., Ly, J., & Main, A. (2014). Parent-child cultural orientations and child adjustment in Chinese American immigrant families. *Developmental Psychology*, *50*(1), 189–201. <https://doi.org/10.1037/a0032473>.
- Chen, W. W., & Wong, Y. L. (2014). What my parents make me believe in learning: the role of filial piety in Hong Kong students' motivation and academic achievement. *International Journal of Psychology*, *49*(4), 249–256. <https://doi.org/10.1002/ijop.12014>.
- Chen, X., & Graham, S. (2018). Doing better but feeling worse: an attributional account of achievement–self-esteem disparities in Asian American students. *Social Psychology of Education*, *21*(4), 937–949. <https://doi.org/10.1007/s11218-018-9447-9>.
- Cokley, K., McClain, S., Enciso, A., & Martinez, M. (2013). An examination of the impact of minority status stress and impostor feelings on the mental health of diverse ethnic minority college students. *Journal of Multicultural Counseling and Development*, *41*(2), 82–95. <https://doi.org/10.1002/j.2161-1912.2013.00029.x>.
- Costigan, C. L., & Dokis, D. P. (2006). Relations between parent-child acculturation differences and adjustment within immigrant Chinese families. *Child Development*, *77*(5), 1252–1267. <https://doi.org/10.1111/j.1467-8624.2006.00932.x>.
- Cuellar, I., Arnold, B., & Maldonado, R. (1995). Acculturation rating scale for Mexican Americans-II: a revision of the original ARSMA scale. *Hispanic Journal of Behavioral Sciences*, *17*(3), 275–304. <https://doi.org/10.1177/07399863950173001>.
- Dambrun, M., Ricard, M., Després, G., Dreton, E., Gibelin, E., Gibelin, M., & Michaux, O. (2012). Measuring happiness: from fluctuating happiness to authentic-durable happiness. *Frontiers in Psychology*, *3*, 16. <https://doi.org/10.3389/fpsyg.2012.00016>.
- de Brey, C., Musu, L., McFarland, J., Wilkinson-Flicker, S., Diliberti, M., Zhang, A., & Wang, X. (2019). *Status and trends in the education of racial and ethnic groups 2018 (NCES 2019-038)*. Washington, DC: National Center for Education Statistics. <https://nces.ed.gov/pubsub/2019/2019038.pdf>.
- Deer, L. K., Shields, G. S., Ivory, S. L., Hostinar, C. E., & Telzer, E. H. (2018). Racial/ethnic disparities in cortisol diurnal patterns and affect in adolescence. *Development and Psychopathology*, *30*(5), 1977–1993. <https://doi.org/10.1017/s0954579418001098>.
- Doane, L. D., Mineka, S., Zinbarg, R. E., Craske, M., Griffith, J. W., & Adam, E. K. (2013). Are flatter diurnal cortisol rhythms associated with major depression and anxiety disorders in late adolescence? The role of life stress and daily negative emotion. *Development and Psychopathology*, *25*(3), 629–642. <https://doi.org/10.1017/s0954579413000060>.
- Eppelmann, L., Parzer, P., Lenzen, C., Bürger, A., Haffner, J., Resch, F., & Kaess, M. (2016). Stress, coping and emotional and behavioral problems among German high school students. *Mental Health & Prevention*, *4*(2), 81–87. <https://doi.org/10.1016/j.mhp.2016.03.002>.
- Espinoza, G., Gonzales, N. A., & Fuligni, A. J. (2013). Daily school peer victimization experiences among Mexican-American adolescents: associations with psychosocial, physical and school adjustment. *Journal of Youth and Adolescence*, *42*(12), 1775–1788. <https://doi.org/10.1007/s10964-012-9874-4>.
- Estes, A., Munson, J., Dawson, G., Koehler, E., Zhou, X. H., & Abbott, R. (2009). Parenting stress and psychological functioning among mothers of preschool children with autism and developmental delay. *Autism*, *13*(4), 375–387. <https://doi.org/10.1177/1362361309105658>.
- Fuligni, A. J., Telzer, E. H., Bower, J., Irwin, M. R., Kiang, L., & Cole, S. W. (2009). Daily family assistance and inflammation among adolescents from Latin American and European backgrounds. *Brain, Behavior, and Immunity*, *23*(6), 803–809. <https://doi.org/10.1016/j.bbi.2009.02.021>.
- Heissel, J. A., Sharkey, P. T., Torrats-Espinoza, G., Grant, K., & Adam, E. K. (2018). Violence and vigilance: the acute effects of community violent crime on sleep and cortisol. *Child Development*, *89*(4), 323–331. <https://doi.org/10.1111/cdev.12889>.
- Huang, K. Y., Calzada, E., Cheng, S., & Brotman, L. M. (2012). Physical and mental health disparities among young children of Asian immigrants. *The Journal of Pediatrics*, *160*(2), 331–336. <https://doi.org/10.1016/j.jpeds.2011.08.005>.
- Huynh, V. W., & Fuligni, A. J. (2010). Discrimination hurts: the academic, psychological, and physical well-being of adolescents. *Journal of Research on Adolescence*, *20*(4), 916–941. <https://doi.org/10.1111/j.1532-7795.2010.00670.x>.
- Hwang, W. C., & Ting, J. Y. (2008). Disaggregating the effects of acculturation and acculturative stress on the mental health of Asian Americans. *Cultural Diversity and Ethnic Minority Psychology*, *14*(2), 147–154. <https://doi.org/10.1037/1099-9809.14.2.147>.
- Jayanthi, P., Thirunavukarasu, M., & Rajkumar, R. (2015). Academic stress and depression among adolescents: a cross-sectional study. *Indian Pediatrics*, *52*(3), 217–219. <https://doi.org/10.1007/s13312-015-0609-y>.
- Kiang, L., Yip, T., Gonzales-Backen, M., Witkow, M., & Fuligni, A. J. (2006). Ethnic identity and the daily psychological well-being of adolescents from Mexican and Chinese backgrounds. *Child Development*, *77*(5), 1338–1350. <https://doi.org/10.1111/j.1467-8624.2006.00938.x>.
- Kirschbaum, C., & Hellhammer, D. H. (1989). Salivary cortisol in psychobiological research: an overview. *Neuropsychobiology*, *22*(3), 150–169. <https://doi.org/10.1159/000118611>.
- Lee, S., Juon, H. S., Martinez, G., Hsu, C. E., Robinson, E. S., Bawa, J., & Ma, G. X. (2009). Model minority at risk: expressed needs of mental health by Asian American young adults. *Journal of Community Health*, *34*(2), 144–152. <https://doi.org/10.1007/s10900-008-9137-1>.
- Li, J. (2016). The indispensable role of culture in shaping children's learning beliefs. In R. R. B. King & A. B. I. Bernardo (Eds), *The psychology of Asian learner: a Festschrift in honor of David Watkins* (pp. 37–51). Singapore: Springer. [https://doi.org/10.1007/978-981-287-576-1\\_3](https://doi.org/10.1007/978-981-287-576-1_3).
- Lim, S. L., Yeh, M., Liang, J., Lau, A. S., & McCabe, K. (2008). Acculturation gap, intergenerational conflict, parenting style, and youth distress in immigrant Chinese American families. *Marriage & Family Review*, *45*(1), 84–106. <https://doi.org/10.1080/01494920802537530>.
- Liu, Y., & Lu, Z. (2011). Longitudinal analysis of Chinese high school student's stress in school and academic achievement. *Educational Psychology*, *31*(6), 723–729. <https://doi.org/10.1080/01443410.2011.600245>.
- Maykel, C., deLeyer-Tiarks, J., & Bray, M. A. (2018). Academics-tress: what is the problem and what can educators and parents do to help? In S. Deb (Eds), *Positive schooling and child development* (pp. 27–40). Singapore: Springer. [https://doi.org/10.1007/978-981-13-0077-6\\_2](https://doi.org/10.1007/978-981-13-0077-6_2).
- McCarty, C. A., Mason, W. A., Kosterman, R., Hawkins, J. D., Lengua, L. J., & McCauley, E. (2008). Adolescent school failure predicts later depression among girls. *Journal of Adolescent Health*, *43*(2), 180–187. <https://doi.org/10.1016/j.jadohealth.2008.01.023>.
- McEwen, B. S. (1998). Protective and damaging effects of stress mediators. *New England Journal of Medicine*, *338*(3), 171–179. <https://doi.org/10.1056/nejm199801153380307>.
- McNair, D. M., Lorr, M., & Droppleman, L. F. (1971). *Manual for the profile of mood states (POMS)*. San Diego, CA: Educational and Industrial Testing Service.
- Michels, N., Sioen, I., Huybrechts, I., Bammann, K., Vanaelst, B., De Vriendt, T., & De Henauw, S. (2012). Negative life events, emotions and psychological difficulties as determinants of salivary cortisol in Belgian primary school children. *Psychoneuroendocrinology*, *37*(9), 1506–1515. <https://doi.org/10.1016/j.psyneuen.2012.02.004>.



- Mrug, S., Tyson, A., Turan, B., & Granger, D. A. (2016). Sleep problems predict cortisol reactivity to stress in urban adolescents. *Physiology & Behavior*, *155*, 95–101. <https://doi.org/10.1016/j.physbeh.2015.12.003>.
- Murberg, T. A., & Bru, E. (2004). School-related stress and psychosomatic symptoms among Norwegian adolescents. *School Psychology International*, *25*(3), 317–332. <https://doi.org/10.1177/0143034304046904>.
- Neece, C. L., Green, S. A., & Baker, B. L. (2012). Parenting stress and child behavior problems: a transactional relationship across time. *American Journal on Intellectual and Developmental Disabilities*, *117*(1), 48–66. <https://doi.org/10.1352/1944-7558-117.1.48>.
- Ng, F. F. Y., Pomerantz, E. M., & Deng, C. (2014). Why are Chinese mothers more controlling than American mothers? “My child is my report card”. *Child Development*, *85*(1), 355–369. <https://doi.org/10.1111/cdev.12102>.
- Ng, F. F. Y., Pomerantz, E. M., & Lam, S. F. (2013). Mothers’ beliefs about children’s learning in Hong Kong and the United States: implications for mothers’ child-based worth. *International Journal of Behavioral Development*, *37*(5), 387–394. <https://doi.org/10.1177/0165025413483393>.
- Parke, R. D., Coltrane, S., Duffy, S., Buriel, R., Dennis, J., Powers, J., & Widaman, K. F. (2004). Economic stress, parenting, and child adjustment in Mexican American and European American families. *Child Development*, *75*(6), 1632–1656. <https://doi.org/10.1111/j.1467-8624.2004.00807.x>.
- Piazza, J. R., Charles, S. T., Sliwinski, M. J., Mogle, J., & Almeida, D. M. (2013). Affective reactivity to daily stressors and long-term risk of reporting a chronic physical health condition. *Annals of Behavioral Medicine*, *45*(1), 110–120. <https://doi.org/10.1007/s12160-012-9423-0>.
- Pomerantz, E. M., Ng, F. F. Y., Cheung, C. S. S., & Qu, Y. (2014). Raising happy children who succeed in school: lessons from China and the United States. *Child Development Perspectives*, *8*(2), 71–76. <https://doi.org/10.1111/cdep.12063>.
- Pruessner, J. C., Kirschbaum, C., Meinlschmid, G., & Hellhammer, D. H. (2003). Two formulas for computation of the area under the curve represent measures of total hormone concentration versus time-dependent change. *Psychoneuroendocrinology*, *28*(7), 916–931. [https://doi.org/10.1016/s0306-4530\(02\)00108-7](https://doi.org/10.1016/s0306-4530(02)00108-7).
- Putwain, D. W. (2007). Test anxiety in UK schoolchildren: prevalence and demographic patterns. *British Journal of Educational Psychology*, *77*(3), 579–593. <https://doi.org/10.1348/000709906x161704>.
- Qu, Y., & Pomerantz, E. M. (2015). Divergent school trajectories in early adolescence in the United States and China: an examination of underlying mechanisms. *Journal of Youth and Adolescence*, *44*(11), 2095–2109. <https://doi.org/10.1007/s10964-014-0201-0>.
- Qu, Y., Pomerantz, E. M., & Deng, C. (2016a). Mothers’ goals for adolescents in the United States and China: Content and transmission. *Journal of Research on Adolescence*, *26*(1), 126–141. <https://doi.org/10.1111/jora.12176>.
- Qu, Y., Pomerantz, E. M., Wang, M., Cheung, C., & Cimpian, A. (2016b). Conceptions of adolescence: implications for differences in engagement in school over early adolescence in the United States and China. *Journal of Youth and Adolescence*, *45*(7), 1512–1526. <https://doi.org/10.1007/s10964-016-0492-4>.
- Raudenbush, S. W., Bryk, A. S., Cheong, Y. F., & Congdon, R. (2019). *HLM 8 for Windows [Computer software]*. Skokie, IL: Scientific Software International, Inc.
- Rubin, D. B. (1987). Multiple imputation for nonresponse in surveys. New York, NY: Wiley. <https://doi.org/10.1002/9780470316696>.
- Rubin, D. B. (1996). Multiple imputation after 18+ years. *Journal of the American Statistical Association*, *91*, 473–489. <https://doi.org/10.1080/01621459.1996.10476908>.
- Schofield, T. J., Parke, R. D., Kim, Y., & Coltrane, S. (2008). Bridging the acculturation gap: Parent-child relationship quality as a moderator in Mexican American families. *Developmental Psychology*, *44*(4), 1190–1194. <https://doi.org/10.1037/a0012529>.
- Sladek, M. R., & Doane, L. D. (2015). Daily diary reports of social connection, objective sleep, and the cortisol awakening response during adolescents’ first year of college. *Journal of Youth and Adolescence*, *44*(2), 298–316. <https://doi.org/10.1007/s10964-014-0244-2>.
- Stawski, R. S., Cichy, K. E., Piazza, J. R., & Almeida, D. M. (2013). Associations among daily stressors and salivary cortisol: findings from the National Study of Daily Experiences. *Psychoneuroendocrinology*, *38*(11), 2654–2665. <https://doi.org/10.1016/j.psyneuen.2013.06.023>.
- Symeou, L. (2007). Cultural capital and family involvement in children’s education: tales from two primary schools in Cyprus. *British Journal of Sociology of Education*, *28*(4), 473–487. <https://doi.org/10.1080/01425690701369525>.
- Telzer, E. H., & Fuligni, A. J. (2009). Daily family assistance and the psychological well-being of adolescents from Latin American, Asian, and European backgrounds. *Developmental Psychology*, *45*(4), 1177–1189. <https://doi.org/10.1037/a0014728>.
- Vincent, C. (2017). ‘The children have only got one education and you have to make sure it’s a good one’: parenting and parent–school relations in a neoliberal age. *Gender and Education*, *29*(5), 541–557. <https://doi.org/10.1080/09540253.2016.1274387>.
- Wang, Y., & Benner, A. D. (2014). Parent–child discrepancies in educational expectations: Differential effects of actual versus perceived discrepancies. *Child Development*, *85*(3), 891–900. <https://doi.org/10.1111/cdev.12171>.
- Wang, Y., & Yip, T. (in press). Sleep facilitates coping: Moderated mediation of daily sleep, ethnic/racial discrimination, stress responses, and adolescent well-being. *Child Development*. <https://doi.org/10.1111/cdev.13324>.
- Wheeler, L. A., Updegraff, K. A., Umaña-Taylor, A., & Tein, J. Y. (2014). Mexican-origin parents’ latent occupational profiles: associations with parent–youth relationships and youth aspirations. *Developmental Psychology*, *50*(3), 772–783. <https://doi.org/10.1037/a0034170>.
- Wong, B. (2015). A blessing with a curse: model minority ethnic students and the construction of educational success. *Oxford Review of Education*, *41*(6), 730–746. <https://doi.org/10.1080/03054985.2015.1117970>.
- Wyatt, L. C., Ung, T., Park, R., Kwon, S. C., & Trinh-Shevrin, C. (2015). Risk factors of suicide and depression among Asian American, Native Hawaiian, and Pacific Islander youth: a systematic literature review. *Journal of Health Care for the Poor and Underserved*, *26*(2), 191–237. <https://doi.org/10.1353/hpu.2015.0059>.
- Yamamoto, Y., & Holloway, S. D. (2010). Parental expectations and children’s academic performance in sociocultural context. *Educational Psychology Review*, *22*(3), 189–214. <https://doi.org/10.1007/s10648-010-9121-z>.
- Yeh, C. J. (2003). Age, acculturation, cultural adjustment, and mental health symptoms of Chinese, Korean, and Japanese immigrant youths. *Cultural Diversity and Ethnic Minority Psychology*, *9*(1), 34–48. <https://doi.org/10.1037/1099-9809.9.1.34>.
- Yip, T., & Fuligni, A. J. (2002). Daily variation in ethnic identity, ethnic behaviors, and psychological well-being among American adolescents of Chinese descent. *Child Development*, *73*(5), 1557–1572. <https://doi.org/10.1111/1467-8624.00490>.
- Zeiders, K. H., Doane, L. D., & Roosa, M. W. (2012). Perceived discrimination and diurnal cortisol: examining relations



among Mexican American adolescents. *Hormones and Behavior*, 61(4), 541–548. <https://doi.org/10.1016/j.yhbeh.2012.01.018>.

Zhang, J., & Zheng, Y. (2017). How do academic stress and leisure activities influence college students' emotional well-being? A daily diary investigation. *Journal of Adolescence*, 60, 114–118. <https://doi.org/10.1016/j.adolescence.2017.08.003>.

Zych, I., Baldry, A. C., & Farrington, D. P. (2017). School bullying and cyberbullying: Prevalence, characteristics, outcomes, and prevention. In V. B. Van Hasselt & M. L. Bourke (Eds), *Handbook of behavioral criminology: contemporary strategies and issues*. New York: Springer.

**Yang Qu** is an Assistant Professor in the School of Education and Social Policy at Northwestern University. His research focuses on

cultural differences in adolescents' academic, social, and emotional development and the role of parents in adolescent development.

**Beiming Yang** is a Ph.D. student in Human development and Social Policy at Northwestern University. His major research interests include parenting, children's motivation, and emotional well-being in different cultures.

**Eva H. Telzer** is an Associate Professor of Psychology at the University of North Carolina, Chapel Hill. Her research focuses on family relationships and adolescent development among culturally and ethnically diverse populations.