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Education of Family Members and Trajectories of Depressive Symptoms among Older Adults***

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ABSTRACT

Objectives. To investigate (a) the extent to which the educational attainments of family members—father, spouse, and children—are associated with the depressive symptoms of older adults and (b) whether there are gender differences in these patterns.

Methods. We use five waves (over 16 years) of a nationally representative sample of 4,716 Taiwanese aged 50+. Multilevel growth curve models are used to examine the associations between education of family members and the intercept and the age slope of CES-D scores.

Results. Having a more educated father is associated with lower levels of depressive symptoms, but the association disappears when taking the respondent's own education into account. Including spouse's education substantially attenuates the association with respondent's education. A similar pattern is evident when children's education is added to the model. The association between family members' education and depressive symptoms appears to be the strongest for children's education, although its strength gradually weakens as the respondent ages. We find no evidence that the associations differ by gender.

Discussion. The observed relationship is not necessarily causal, but it underscores the potential importance of children's education for psychological wellbeing in old age. We discuss possible mechanisms underlying the association between adult children's education and the psychological wellbeing of their elderly parents.

Key words: Education—Depression—Family—Children—Gender

INTRODUCTION

The benefit of education on individuals' psychological wellbeing is well-documented. With increasing educational attainment, individuals experience less psychiatric morbidity (Kessler, et al., 2005) and lower levels of psychological distress (Ross & Mirowsky, 2006). Educational differences in mental health may stem from differences in both material and non-material resources. Education itself operates as human capital that helps individuals procure other resources, such as earnings and social status (Hout, 2012). In addition, psychological wellbeing may increase with education, because higher levels of education are associated with healthier lifestyles, increased knowledge about health, and better proficiency at negotiating health care services (Mirowsky & Ross, 2003), as well as less exposure to stressors and better coping resources (Pearlin, 1989; Thoits, 1995). Research on education and psychological wellbeing has focused mainly on individuals' own education; few studies have moved beyond the individual to investigate family-level resources, such as the education of parents, spouses, or children. Of these studies, most have investigated only spouses' education (e.g., Monden, van Lenthe, De Graaf, & Kraaykamp, 2003) or parents' education (e.g., Luo & Waite, 2005); the effect of children's education on the psychological wellbeing of older adults has received little attention.

The family is among the most significant institutions that affect psychological wellbeing, as its strong social ties can provide socioeconomic and psychological resources and/or strains (Carr, Springer, & Williams, 2014). There are likely spillover effects of family members' education through social interactions, which may entail imitation of lifestyles or knowledge exchange about preventive health care (Kravdal, 2008; Monden, et al., 2003; Smith & Christakis,

2008). Yet, the primary agent of this influence may change over the life course from parents, to partners, to adult children (Umberson, 1992). From childhood to young adulthood, parents have a strong effect on their children's wellbeing by providing them with socioeconomic resources and by monitoring their health-related behaviors (Steinberg & Morris, 2001). For example, children who grow up with parents under economic hardship are more likely to have higher levels of psychological distress (Conger, Ge, Elder, Lorenz, & Simons, 1994). Some studies have found that the effect of socioeconomic disadvantage on mental health may persist well into adulthood, even after taking into account adult socioeconomic status (SES) (Gilman, Kawachi, Fitzmaurice, & Buka, 2002), yet the effects of parental education may diminish in old age (Moody-Ayers, Lindquist, Sen, & Covinsky, 2007).

Marriage may result in a decline of parents' influence on health because marital partners tend to assume the leading role in monitoring one another's health (Umberson, 1992). Married couples tend to have strong social, financial, legal, and emotional bonds and often exchange socioeconomic resources to maximize not only their own wellbeing but also that of their spouse (Brown, Hummer, & Hayward, 2014; Monden, et al., 2003). Emerging studies have documented that even after accounting for one's own education, having a better-educated spouse is associated with a lower risk of mortality (Jaffe, Eisenbach, Neumark, & Manor, 2006; Kravdal, 2008) and higher levels of self-rated health (Brown, et al., 2014). In addition, studies have shown that mental health outcomes are correlated between spouses. Such an association may be partially attributed to assortative mating (i.e., men and women who have the same SES are more likely to become partners), yet recent studies have indicated a spillover effect of mental health status from one spouse to the other (Fletcher, 2009); for example, having a spouse with higher levels of depressive symptoms at baseline is associated with elevated levels of depressive symptoms in a

follow-up interview (Siegel, Bradley, Gallo, & Kasl, 2004). Few studies, however, have investigated the influences of a spouse's education on an individual's psychological wellbeing.

The intergenerational influences from parents to children may flow in the opposite direction as children mature (Silverstein, Conroy, Wang, Giarrusso, & Bengtson, 2002). Emotional, informational, or financial support from adult children may be particularly important for psychological wellbeing in old age, when individuals experience dramatic life transitions, such as involuntary retirement (Gallo, Bradley, Siegel, & Kasl, 2000) and loss of a spouse (Ha, Carr, Utz, & Nesse, 2006). Such support may vary by the educational levels of children. Children with more education may be more likely to encourage their parents to adopt health-enhancing lifestyles while avoiding unhealthy behaviors, and better-educated children may use their resources to find timely and superior health care services for their ill parents (Friedman & Mare, in press; Torssander, 2013). Children's education may indirectly influence parental psychological wellbeing. Transmission of stress across persons and stress buffering effects are additional possible explanations (Cohen & Wills, 1985; Thoits, 1995). Well-educated children, who typically have stable earnings and jobs, may be less likely to be a source of psychological burden for their parents than less-educated children (Ryff, Lee, Essex, & Schmutte, 1994). They also may be able to buffer the effects of financial stressors on their parents (Xie & Zhu, 2009).

A growing body of research has indicated a positive association between children's education and parental health. Using data from Taiwan, Zimmer et al. (2002) were the first to report a significant association between children's education and their parents' functional limitations, particularly for older adults who have severe limitations. Zimmer et al. (2007) found that for Taiwan—where older parents tend to rely on children's support for their later life wellbeing—higher educational levels of both older adults and adult-children reduce the risk of

older adults' mortality, but children's education appears to be more important, mainly for parents who have serious health conditions. Findings from U.S. data are consistent; Friedman and Mare (in press) reported that children's education has an effect on parents' mortality that is independent of parents' own education, although the effect weakens over the life course. Researchers have also indicated that the health behaviors of parents, such as smoking and exercise, partially explain why children's education is inversely associated with parental death rates. Torssander (2013) found similar results in Sweden, where older adults who have children with tertiary education have a lower risk of mortality than those who have children with only compulsory schooling, even after controlling for education and other SES characteristics of parents. Taken together, studies from both Eastern and Western societies have highlighted the importance of children's education as a factor in determining the health of older adults, yet extant studies are largely limited to physical wellbeing; no studies have investigated the psychological wellbeing of older parents.

Whether men and women receive the same benefits from the educational attainments of family members remains an open question. Because of gender inequality in SES, women generally have fewer socioeconomic resources than men. Such inequality is particularly prevalent among older generations where women have lower educational attainment, more restricted opportunities for paid employment, and more economic dependency (Carr, 2004; Hsu, 2005). Women may therefore rely more heavily on family members' education for their wellbeing. Findings from prior studies, which are based primarily in Western societies, have shown that parents' socioeconomic resources have protective effects on health for both men and women (Galobardes, Lynch, & Smith, 2004; Hayward & Gorman, 2004; Luo & Waite, 2005). Still, results regarding the role of spouses' education have been mixed. Some studies conducted

in Europe, Israel, and China have shown that wives' education is beneficial for men's health (Jaffe, et al., 2006; Li, Fu, Zhao, Luo, & Kawachi, 2013; Monden, et al., 2003), while other studies in the United States have suggested that wives' education is negatively associated with men's health (Haynes, Eaker, & Feinleib, 1983; Suarez & Barrett-Connor, 1984). Research on husbands' education and wives' health, though, is unambiguous: it has consistently shown protective effects on women's health across countries (Li, et al., 2013; Monden, et al., 2003; Wilson, 2002). In addition, a study conducted in the United States has found that the association between individuals' own education and health is largely reduced when their spouses' education is taken into account and that the reduction is greater for women than men (Brown, et al., 2014). Regarding children's education, Torssander (2013) found that the inverse association between children's education and parental mortality risk was stronger for women than men in Sweden, although the association was not statistically significant. Given gender inequalities in SES, longevity, and possibly length of co-residence with children, women may more strongly rely on or benefit from their children's education for their psychological wellbeing. Thus, this study proposes the following three hypotheses.

H1: The education of family members—father, spouse, or children—is positively associated with the psychological wellbeing of older adults after taking into account the respondent's own education.

H2: Children's education is more important than other family members' education for the psychological wellbeing of older adults.

H3: Women are more likely than men to benefit from family members' education—particularly children's education.

METHODS

Data

The current study included participants in the Taiwanese Longitudinal Study of Aging (TLSA), a nationally representative survey designed to assess the health of older people in Taiwan. TLSA began in 1989 for a cohort aged 60 and older (n = 4,049). Follow-up interviews were completed every 3 to 4 years. In 1996, a younger refresher cohort aged 50 – 66 (n = 2,462) was added. Prior to the 2011 survey, 3,795 respondents from the original two cohorts (n = 6511) had died (58% of the original sample), and another 17 % respondents were not interviewed in at least one wave. More detailed information about TLSA is available elsewhere (Chang, et al., 2012). We used the 1996 survey as a baseline and included the five waves from 1996 through 2011. Our study included only respondents who reported having had at least one child at baseline (n = 4,937, 96% of the sample).

Measures

Education. We used the baseline wave of TLSA to determine educational attainment of the respondent and family members. Respondents reported years of education, ranging from 0 to 17, for each of their family members—father (mean = 1.80, SD = 3.52), spouse (mean = 4.61, SD = 4.34) and children (mean =10.69, SD = 3.22), as well as their own education (mean = 4.69, SD = 4.55). Correlations between each family member's education range from .31 (father and respondent's child) to .53 (respondent and child). Taiwanese education systems were not uniform across the three generations, and thus, an increase in one year of schooling may reflect different values of human capital and may not be strictly comparable across generations. Specifically, there are wide gaps in educational levels across the three generations. The overwhelming

majority of respondents' fathers had no formal education whatsoever (76 %), approximately half of female and one fifth of male respondents had no formal education, but very few of their children had no education (< 1%). It is likely that selection into the "no formal education" group differs across generations. Accordingly, to facilitate meaningful comparisons across generations, we standardized the measure of education for each family member in the pooled sample (mean = 0 and standard deviation [SD] = 1). Since most respondents had multiple children (mean = 4.35, SD = 1.82), there were many ways to construct a measure denoting the education of children. We used the average educational attainment of all living children. In preliminary analyses, we considered several alternatives (highest educational level, average educational level, and lowest educational level of all living children). Our findings were generally consistent across measures, although the strength of the association between children's education and depressive symptoms of respondents was strongest using the average and weakest using the minimum years of schooling of all living children.

Depressive symptoms was measured by a 10-item subset of the 20-item Center for Epidemiological Studies Depression scale (CES-D) (Radloff, 1977). Respondents were asked how often in the past week they experienced negative situations or feelings that fall into four domains: 1) somatic symptoms (poor appetite, everything is an effort, poor sleep, and no energy), 2) depressive affect (bad mood, lonely, and sad), 3) interpersonal relations (people are unfriendly), and 4) positive affect (feel happy, and life is going well). Possible responses for each item range from 0 ("rarely or none of the time [less than 1 day]") to 3 ("most or all of the time [5–7 days]"). The composite CES-D score is obtained as a sum of the 10 items and thus potentially ranges from 0 to 30. Average internal consistency (Cronbach's alpha) for these ten items for the five survey waves was .83. Shortened forms of the CES-D scale have been shown

to demonstrate similar internal consistency, factor structure, and accuracy in detecting depressive symptoms as the full 20-item CES-D scale in both Western and Eastern populations (Andresen, Malmgren, Carter, & Patrick, 1994; Boey, 1999; Cheng & Chan, 2005; Turvey, Wallace, & Herzog, 1999).

Covariates. We included seven controls in all models: 1) age (the underlying time-scale), 2) gender, 3) marital status (married/cohabitating or not), 4) residential area (living in rural area or not), 5) co-residence with children, 6) number of living children, and 7) whether the respondent's youngest child is under age 25. Some respondents had children who were still young at baseline and had not completed their schooling. Thus, we set the age cutoff for the respondent's youngest child at 25 because most Taiwanese who continue their education beyond compulsory schooling complete their higher education/certification (e.g., college) by about that age (Gindling & Sun, 2002).

Family SES characteristics other than education may affect both children's educational attainment and the psychological wellbeing of their parents. Thus, we included the prestige of the major lifetime occupation of fathers, respondents, and spouses into the final model to reduce potential confounding (see analytic strategy for details). Major lifetime occupation was measured using a socioeconomic index (SEI) developed by Tsai & Chiu (1991), based on the strategy of Duncan (1961) and Featherman and Stevens (1982); scores range from 55.1 for farm laborers to 76.1 for scientists, doctors, and teachers. Approximately 30% of women were missing data for SEI because they had no occupation (keeping house or don't know their occupation). Thus, we used a dichotomous measure indicating a high status occupation (SEI $\geq$ 60); a high status occupation included professional and technical workers, administrative, managerial, and supervisory workers, salespersons, and other skilled workers; the reference group comprised

semi-skilled workers, agricultural workers (e.g., farmers and fishermen), service workers, and laborers, as well as individuals with no major lifetime occupation. TLSA does not include information about children's occupation. Some control variables—for example, marital status, residential area, or co-residence with children—may change over time. We used baseline values because we were not able to ascertain the temporal ordering of changes in these variables in relation to depressive symptoms.

Analytic strategy

Of the original respondents (n = 4,937), 2,416 (49%) died by the 16-year follow-up. Among those who survived and participated at any given wave, about 20 % of respondents had missing data for at least one variable. Most persons with missing data were interviewed by proxy and, thus, were not administered the CES-D. We used "multiple imputation, then deletion" (MID)—that is, we conducted imputations, including dependent variables (MI), and then deleted observations with imputed dependent variables. Von Hippel (2007) has argued that, compared with conventional MI, MID gives more accurate estimates of the standard error and is more robust to problems in the imputation model. The final analytic sample for all 4,716 respondents included a total of 16,188 observations across five survey waves.

We used multilevel models (Raudenbush & Bryk, 2001; Singer & Willett, 2003) to estimate the age trajectory of depressive symptoms. We analyzed a two-level model: 1) the level-1 model for individual change in depressive symptoms over time and 2) the level-2 model for inter-individual differences in trajectory change by values of the level-2 predictors (time-invariant characteristics of the individual) (Singer & Willett, 2003). Age was used for the underlying time-scale. To facilitate parameter interpretation, we centered age at 65 at baseline

(i.e., setting 65 to 0) and the number of living children at the sample mean (= 4.35); the intercept can thus be interpreted as the mean CES-D score at age 65 for an individual who is in the reference group for each of the categorical variables with mean values for all continuous variables. In a preliminary model, we found that the age trajectory of depressive symptoms followed a curvilinear pattern, yet the coefficient of the quadratic term (age^2) was close to zero (= .001, p = .02) and no longer significant when covariates were introduced to the model (= .0006, p = .15). Thus, for all analyses we modeled the age trajectory as linear within the age range of the sample (50 to 106). There were substantial gender differences in the trajectory of depressive symptoms, with a higher intercept and age slope for women. Thus, we allowed gender to affect both the intercept and the age slope.

Our analyses followed a two-step procedure to investigate the extent to which the educational attainments of family members were associated with the intercept and age slope of CES-D scores, while controlling for time-invariant covariates measured at baseline (i.e., gender, marital status, residential area, co-residence with children, number of living children, and whether the respondent has a child under age 25). First, we assessed whether the education of *each* family member—father, respondent, spouse, and children (Table 2, Models A through D)—was significantly associated with (1) the intercept and (2) the age slope by including the age interaction term. We then tested whether there were gender differences in the associations by adding the gender interaction term. We explicitly tested all age and gender interaction terms with each family member's schooling. Second, we estimated a series of nested models by adding father's education first, then respondent's, then spouse's, and finally children's education (Table 3, Models 1 through 4). Significant age interaction terms were added to Model 5 to ascertain whether the age slope for depressive symptoms varies by family members' education. By testing

interaction effects between family members' schooling and respondent's gender, we determined whether gender differences were significant in Models 1 through 5.

To reduce the possibility that unmeasured SES characteristics determine both children's education and parent's depressive symptoms, we added three potential confounders—the occupational prestige of the father, respondent, and spouse—into the models, but since none of those coefficients was significant, they are not included in all of the models shown here (results available upon request). Prior studies have indicated that among those whose family members (e.g., parents) are poorly educated, the respondents' own educational achievement may be particularly important for their health (Ross & Mirowsky, 2011). Thus, in an exploratory analysis, we included interaction terms to test whether associations between family members' education and depressive symptoms depended on the respondent's own education. Because none of the interactions between the respondent's and each family member's education was significant, we did not include them in the models presented here.

RESULTS

Table 1 presents descriptive statistics for men and women who had at least one child in 1996. Women had higher scores on depressive symptoms than men. There were substantial gender gaps with regard to educational attainment. While the average woman completed 2.8 years of schooling, the average man completed only 6.4 years ($p < .001$). Similarly, average years of education was 5.3 for respondents' husbands and 4.0 for respondents' wives ($p < .001$).

Table 2 displays growth curve estimates of depressive symptoms by each family member's education. All of the models included the following covariates: gender, marital status, residential area, co-residence with children, number of living children, and whether the

respondent has a child under age 25. In Model A1, father's education was inversely associated with depressive symptoms: a one SD increase in father's education (i.e., 3.52 years of schooling) was associated with CES-D scores that were .402 points lower. Interactions with age (Model A2) and gender (Model A3) were not significant. Similarly, there was a negative coefficient of respondent's education in Model B: a one SD increase in respondent's education (i.e., 4.55 years of schooling) was associated with CES-D scores that were 1.039 points lower. The age interaction term was not significant (Model B2), yet the negative gender interaction term ($p < .001$) indicated that the inverse association between respondent's education and depressive symptoms was larger for women than men (Model B3). In Model C (spouse's education), a one SD increase in spouse's education (i.e., 4.34 years of schooling) was associated with CES-D scores that were .925 points lower. Neither interaction term was significant. Finally, Model D suggests some potential benefits of children's education: a one SD increase in children's education (i.e., 3.22 years of schooling) was associated with CES-D scores that were 1.274 points lower. The age interaction term was positive ($p < .01$), indicating that the education differential in CES-D scores diminished with age (Model D2). There was no significant gender difference in the coefficient of children's education (children's education x gender) and the interaction term between age and children's education also did not significantly differ by gender (children's education x age x gender) (Model D3).

Table 3 displays a series of nested models. Model 2 adds respondent's own education to Model 1 (father's education). Even after adding father's education, the coefficient with respondent's education continued to be significant. The interaction term between gender and respondent's schooling was negative and significant ($b = -.398$), indicating a larger inverse association for women (= -1.268) than men (= -.870). After including respondent's own

education, the coefficient of father's education was close to zero and no longer significant, indicating that respondent's own education largely mediated the association between father's education and depressive symptoms. Model 3 adds spouse's education to Model 2. Having a more educated spouse was significantly associated with lower levels of depressive symptoms even after taking father's and respondent's education into account. After the inclusion of spouse's education, the coefficient of respondent's education on depressive symptoms continued to be significant, although the magnitude of the coefficient was attenuated from that of Model 2 ([.870 – .613] /.870 = 29% for men and [1.268 –.926] /1.268 = 27% for women). Similar to Model 2, we found a negative interaction term between gender and respondent's education (b = -.313), indicating that the inverse association between respondent's education and depressive symptoms remained larger for women than men even after controlling for father's and spouse's education. Model 4 adds children's education to Model 3. Although both respondent's and spouse's education remained statistically significant, the magnitude of these standardized coefficients was substantially smaller than the coefficient of children's education ($p < .01$ for both differences). With the inclusion of children's education in Model 4, the coefficient of spouse's education diminished from those in Model 3 by 43% (from -.529 to -.299). Similarly, the coefficients of respondent's education reduced from those in Model 3 by 34 % for men (from -.613 to -.402) and 31 % for women (from -.926 to -.639). Yet, the interaction term between gender and respondent's education was no longer significant (b = -.237, p = .100).

In Model 5, we confirmed that the association between offspring's schooling and parental depressive symptoms diminished as parents age. The interaction term between age and children's education was positive and continued to be significant even after accounting for other family members' education. We also confirmed that the age interaction term remained significant even

after controlling for the occupational prestige of family members (results not shown). In Figures 1 and 2, we illustrate the association between three values of the children's education variable (one SD above the average, the average, and one SD below the average) and the age trajectories of CES-D scores for men and women, based on the coefficients in Model 5. The figures show that the distances between the growth curves get smaller as age increases, suggesting that the coefficient of children's education is reduced in magnitude. Specifically, among men whose children have the average number of years of education (i.e., 10.69 years of schooling), CES-D scores increased .051 points per year of age, compared with .067 (= .051 + .016) for men whose children have one SD above the average level of education (i.e., 13.91 [= 10.69 + 3.22]) years of schooling). Among women whose children have the average level of education, the CES-D increased .071 (= .051 + .020) points per year of age versus.087 (= .051 + .020 + .016) for women whose children have one SD above the average level of education. For both men and women, compared with respondents whose children have about 11 years of schooling, respondents whose children have about 14 years of schooling had CES-D scores that were 1.013 points lower on average at age 65, but only .693 points lower (-1.013 + [20 × .016]) on average at age 85.

DISCUSSION

Close social relationships, such as family ties, have important health consequences, and a growing body of research has shown that the socioeconomic resources of family members are an important determinant for individuals' wellbeing over the life course in both Western and Eastern societies (Brown, et al., 2014; Ross & Mirowsky, 2011; Zimmer, et al., 2007). Using a nationally representative sample from Taiwan, this study examined the extent to which family

members' education is associated with psychological wellbeing and how the associations differ by gender. Several key contributions arise from our findings. First, the educational attainment of family members matters above and beyond a person's own education, such that individuals with well-educated family member(s) are more likely to maintain psychological wellbeing into old age. Motivated by a life course perspective and social control theory, we expected that the primary agent of this association would change over the life course and that the education of children—as opposed to other family members—would have the strongest association with respondent's psychological wellbeing in old age. Results revealed that the association between father's education and respondent's depressive symptoms was largely mediated by respondent's own education. The introduction of a spouse's education into the models substantially attenuated the association between respondent's own education and psychological wellbeing. When children's education was added, the coefficients for both respondent's and spouse's education dramatically decreased. The association between children's education and psychological wellbeing was the strongest among the various family members, although the coefficients for the respondent's and spouse's education remained significant.

Our findings are in line with evidence from recent studies, which have suggested that children's education has an independent association with parental health (e.g., mortality and functional limitations) after taking the respondent's own SES into account (Friedman & Mare, in press; Torssander, 2013; Zimmer, et al., 2002; Zimmer, et al., 2007). But why does the education of adult children matter for the psychological wellbeing of their parents? Underlying mechanisms might be similar to those of an individual's own education. That is, poorly educated individuals are exposed to more stressors, have lower levels of social support, and mobilize social support less effectively (Eckenrode, 1983; Thoits, 2010). Given that negative and positive

emotions (depression and happiness) may be transmitted through social ties (Smith & Christakis, 2008), we would expect that individuals with less educated children would have higher levels of psychological distress. In addition, education is a marker of social status (Reynolds & Ross, 1998). Thus, some individuals might (re)evaluate their subjective social status through their children's educational achievements. Parents may view their children's educational or occupational accomplishments as indicators of whether or not their children have turned out well and, by extension, of their own success as parents (Ryff, et al., 1994). For example, there is a positive association between the educational and occupational attainments of adult children and their parents' psychological wellbeing, as measured by self-acceptance, purpose in life, and personal growth (Ryff, et al., 1994); having unemployed adult children is positively associated with negative affect (Greenfield & Marks, 2006).

Consistent with prior studies (Ross & Mirowsky, 2006), we found that the relationship between a respondent's schooling and depressive symptoms varied significantly by gender, with a larger association for women than men. The pattern remained significant even after controlling for father's education. Although spousal education largely mediated the association between a respondent's own education and depressive symptoms, the association between a respondent's own education and depressive symptoms continued to be significantly larger for women than men. Our findings indicate that an individual's own education may be particularly important for women because they have fewer alternative resources (e.g., earnings and wealth) to contribute to their psychological wellbeing (Ross & Mirowsky, 2006). However, with the inclusion of children's education, the gender difference in the association between a respondent's education and depressive symptoms was no longer significant. Given that children's schooling largely reflects the educational attainments of parents, children's education mediated the association

between a respondent's education and psychological wellbeing, thus reducing the gender gap in the association. Contrary to our hypothesis, we did not find evidence that women and men benefit differently from family members' education.

The gap in depressive symptoms between parents with well-educated children and those with poorly-educated children decreased in later life. We expected that the influence of children's education would be cumulative, thus widening the gap with increasing age, because having poorly educated children may be related to a greater risk of exposure to stressors, fewer coping resources, and poorer health practices. To confirm robustness of these findings, we explored sampling selection alternatives and an alternative model specification: 1) using a sample restriction of three or more observations per respondent, 2) using an age restriction (65 – 85), and 3) using a binary cutoff for CES-D scores (10 or above; Andresen, et al., 1994). The alternative formulations produced results similar to those described above (results available upon request). There are several plausible explanations for the declining effects of children's education. First, in line with the age-as-leveler hypothesis (House, Lantz, & Herd, 2005), selective mortality and attrition may partially contribute to the observed patterns (Beckett, 2000). Individuals with poorly educated children have a higher mortality rate than those with well-educated children (Zimmer, et al., 2007), and such nonrandom selection might ultimately result in a reduced gap in psychological wellbeing between older adults with well-educated children and those with poorly educated children. In addition, age-related biomedical frailty (Crimmins, Kim, & Seeman, 2009) may overshadow the effect of educational differences on psychological wellbeing.

Second, better-educated children may be more likely to provide information and financial support to their parents, yet they may not provide more emotional support, which is particularly

important among older adults (Liu, Liang, & Gu, 1995), especially as they enter the last stages of life (Chen & Short, 2008). Emotional support may be more salient for depressive symptoms as parents progress through old age—a time when they commonly experience major life transitions and health issues, such as retirement, bereavement, limited mobility, and reduced social activities. The living arrangements of older adults in Chinese society have changed dramatically in recent decades, occurring in tandem with the erosion of the traditional family model of co-residence of married sons with elderly parents (Chu & Yu, 2009; Logan & Bian, 1999). This trend is particularly pervasive among younger individuals who have high SES; for example, couples with higher incomes are less likely to live with, and more likely to live further away from, the husband's parents (Chu, Xie, & Yu, 2011). Wives' resources matter; if a wife earns more income than her husband, the couple is unlikely to co-reside with the husband's parents (Chu & Yu, 2009). In addition, interaction with family members may provide not only support, but also strain (Walen & Lachman, 2000). Conflict between mothers-in-law and daughters-in-law is one example (Wu, et al., 2010). An educated son may follow traditional norms by living with his aging parents, but daughters-in-law, particularly those who are highly educated, may be reluctant to live with their husband's parents. A wide generational gap in educational attainment and occupational opportunity (Yi & Chien, 2002) may further augment strains between mothers-in-law whose major responsibilities were domestic and daughters-in-law who resist traditional roles. Such strains may worsen the psychological wellbeing of older adults, particularly those in need of more emotional support in later life.

Finally, we cannot rule out the possibility that our finding of a stronger inverse association between children's education and the depressive symptoms of parents in midlife than in later life may be driven, at least in part, by reverse causality. That is, respondents may have

developed depressive symptoms before their children completed their schooling, which may have negatively affected their children's educational attainments. This problem of endogeneity is more likely to be evident among middle-aged respondents (whose children may still be attending school) than the oldest respondents (most of whose children completed their schooling decades ago). A respondent's level of depressive symptoms at age 85 is probably not representative of their symptoms 30 or 40 years earlier when they were raising and educating their children because other factors that contribute to depressive symptoms, such as health issues, may have developed later in life. Given that we have no information regarding respondents' depressive symptoms during young adulthood, we cannot investigate this possibility.

Our study has several additional limitations. Although our analysis reduced potential bias by including an extensive set of controls, omitted variables—for example, parent's intelligence and parent's willingness to invest money and time into their children's schooling—may affect both children's education and parents' psychological wellbeing and thereby bias our results. In addition, our measures of educational attainment are based on respondents' reports. Compared to other SES indicators, such as occupation and income, education is more reliably reported, more stable over time, and less subjective (Elo, 2009; Ross & Mirowsky, 2011), but retrospective reports of family members' schooling are still susceptible to recall bias. Finally, findings from this study may be better understood in light of social, historical, and institutional changes in Taiwan. Older adults who were born before World War II had very limited educational opportunities, but their children benefitted from rapid economic development and compulsory basic education, which was established by 1950 in many areas and subsequently spread widely throughout the population (Hay Woo, 1991; Thornton & Lin, 1994). Therefore, intergenerational transfers of educational benefits may be uniquely situated for these two generations and may not

be generalizable to other generations. The influence of children's education on parental psychological wellbeing may be greater in societies like Taiwan, where co-residence of adult-children and their parents was common and parents and children have strong ties. Thus, it would be of considerable interest to replicate the type of analyses presented here using data from societies where different family norms and educational opportunities exist.

Despite these limitations, our findings suggest that the education of family members may influence the wellbeing of older adults. A life course perspective is particularly useful for understanding the extent to which different family members influence the psychological wellbeing of one another during different stages. Our study highlights the possible psychological benefits of having well-educated children, yet the benefits may come early and may matter less at the end of the life course. Taiwan, like other developed countries, has faced rapid social and demographic changes in family structure. One consequence is that the aging population has led to increased demand for and availability of long-term care services for older adults (Chao & Roth, 2005; Thornton, Chang, & Sun, 1984). Although older adults may now be relying less on their children to ensure their later life wellbeing, having well-educated offspring may be advantageous to their mental health.

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Table 1. Means (Standard Deviations [SD]) or Percentages for Analysis Variables by Gender

Variable (observed range)	N	Total (n = 4,716)	Women (n = 2,239)	Men (n = 2,477)	*p* value
CES-D score by survey wave (0 − 30), mean (SD)					
In 1996 (aged 50+)	4,532	5.73 (6.03)	6.70 (6.44)	4.86 (5.49)	< .001
In 1999 (aged 53+)	3,835	5.35 (6.01)	6.36 (6.34)	4.41 (5.54)	.003
In 2003 (aged 57+)	3,237	5.22 (5.77)	6.28 (6.24)	4.20 (5.06)	< .001
In 2007 (aged 61+)	2,620	5.24 (5.78)	6.09 (6.11)	4.38 (5.29)	.055
In 2011 (aged 65+)	1,964	5.31 (6.10)	6.40 (6.59)	4.15 (5.30)	.004
Education of family member (0 − 17), mean (SD)					
Father's education	4,716	1.80 (3.52)	1.62 (3.32)	1.97 (3.69)	< .001
Respondent's education	4,716	4.69 (4.55)	2.81 (3.72)	6.40 (4.55)	< .001
Spouse's education	4,716	4.61 (4.34)	5.32 (4.54)	3.97 (4.04)	< .001
Children's education	4,716	10.69 (3.22)	10.26 (3.36)	11.07 (3.04)	< .001
Controls at baseline					
Age, mean (SD)	4,716	65.70 (9.26)	65.58 (9.45)	65.81 (9.09)	.388
Married/cohabitation,%	4,716	74	63	84	< .001
Living in rural area,%	4,716	39	40	39	.455
Co-residence with children,%	4,716	73	74	72	.048
Number of living children (1 − 12), mean (SD)	4,716	4.35 (1.82)	4.55 (1.81)	4.16 (1.82)	< .001
Child under age 25,%	4,716	19	12	26	< .001

Notes. [1] *p* value indicates the statistical significance of gender differences.

[2] Children's education indicates the average educational attainments of all living children.

Table 2. Growth Curve Estimates of Coefficients of Each Family Member's Education on Depressive Symptoms

		(1) Intercept difference by education	(2) Slope difference by education	(3) Gender difference
Model A: Father	*Fixed effects*			
	Intercept	5.516***	5.499***	5.511***
	Female	1.617***	1.617***	1.623***
	Father's education	-.402***	-.393***	-.355***
	Father's education x Female	----	----	-.110
	Linear age slope (Age − 65)	.064***	.065***	.065***
	Female x (Age − 65)	.026*	.025*	.025*
	Father's education x (Age − 65)	----	-.007	----
	Random effects			
	Level 1: SD of the residuals	4.442***	4.442***	4.442***
	Level 2 :SD of the intercept	3.451***	3.451***	3.451***
	Level 2: SD of the slope	.087***	.087***	.087***
	Level 2: Correlation between the intercept and slope	.833	.833	.833
Model B: Respondent	*Fixed effects*			
	Intercept	5.984***	5.975***	5.918***
	Female	.935***	.939***	.929***
	Respondent's education	-1.039***	-1.032***	-.882***
	Respondent's education x Female	----	----	-.401**
	Linear slope (Age − 65)	.062***	.063***	.063***
	Female x (Age − 65)	.023*	.021	.019
	Respondent's education x (Age - 65)	----	-.003	----
	Random effects			

	Level 1: SD of the residuals	4.445***	4.445***	4.445***
	Level 2 :SD of the intercept	3.362***	3.362***	3.358***
	Level 2: SD of the slope	.084***	.084***	.084***
	Level 2: Correlation between the intercept and slope	.869	.866	.867
Model C: Spouse	*Fixed effects*			
	Intercept	5.436***	5.420***	5.442***
	Female	2.040***	2.039***	2.044****
	Spouse's education	-.925***	-.915***	-.886**
	Spouse's education x Female	----	----	-.071
	Linear slope (Age − 65)	.060***	.059***	.060***
	Female x (Age − 65)	.027*	.028*	.026*
	Spouse's education x (Age − 65)	----	-.005	----
	Random effects			
	Level 1: SD of the residuals	4.444***	4.443***	4.444***
	Level 2 :SD of the intercept	3.373***	3.373***	3.373***
	Level 2: SD of the slope	.085***	.086***	.085***
	Level 2: Correlation between the intercept and slope	.855	.850	.855
Model D: Children	*Fixed effects*			
	Intercept	5.585***	5.663***	5.630***
	Female	1.570***	1.576***	1.627***
	Children's education	-1.274***	-1.357***	-1.273***
	Children's education x Female	----	----	-.163
	Linear slope (Age − 65)	.056***	.052***	.054***
	Female x (Age − 65)	.015	.018	.014
	Children's education x (Age − 65)	----	.017**	.011
	Children's education x (Age − 65) x Female	----	----	.010

Random effects			
Level 1: SD of the residuals	4.441***	4.444***	4.444***
Level 2 :SD of the intercept	3.304***	3.300***	3.300***
Level 2: SD of the slope	.090***	.086***	.086***
Level 2: Correlation between the intercept and slope	.830	.864	.862

Notes. [1] Models 1 though 4 tested the association between respondent's depressive symptoms and education of each family member, such as father, respondent, spouse, and children, respectively. Prior to model fitting, measures of each family member's education were standardized (to mean = 0 and standard deviation [SD] = 1).

[2] All models control for marital status, residential area, co-residency with children, and number of living children, and having a child under age 25 (not shown) in addition to gender and the education variable specified.

[3] The intercept can be interpreted as the mean CES-D scores at age 65 for respondents who are in the reference group for each of the categorical variables (men, n spouse/partner, lives in an urban area, not living with children, no child under age 25) and who have mean values for continuous variables (average number of living children and mean levels of schooling for each family member).

*p < .05, **p < .01, ***p< .001.

Table 3. Growth Curve Estimates of Coefficients of Family Members' Education on Depressive Symptoms

	Model 1	Model 2	Model 3	Model 4	Model 5
Fixed effects					
Intercept	5.516***	5.915***	5.760***	5.746***	5.855***
Female	1.617***	.938***	1.371***	1.389***	1.410***
Father's education	-.402***	-.027	.034	.054	.053
Respondent's education		-.870***	-.613***	-.402***	-.482***
Spouse's education			-.529***	-.299**	-.310**
Children's education				-.924***	-1.013***
Respondent's education x Female		-.398**	-.313*	-.237	
Linear slope (Age − 65)	.064***	.063***	.061***	.056***	.051***
Female x (Age − 65)	.026*	.019	.021	.015	.020
Children's education x (Age − 65)					.016**
Random effects					
Level 1: SD of the residuals	4.442***	4.445***	4.446***	4.445***	4.448***
Level 2 :SD of the intercept	3.451***	3.358***	3.336***	3.260***	3.259***
Level 2: SD of the slope	.087***	.084***	.083***	.086***	.082***
Level 2: Correlation between the intercept and slope	.833	.868	.872	.879	.916

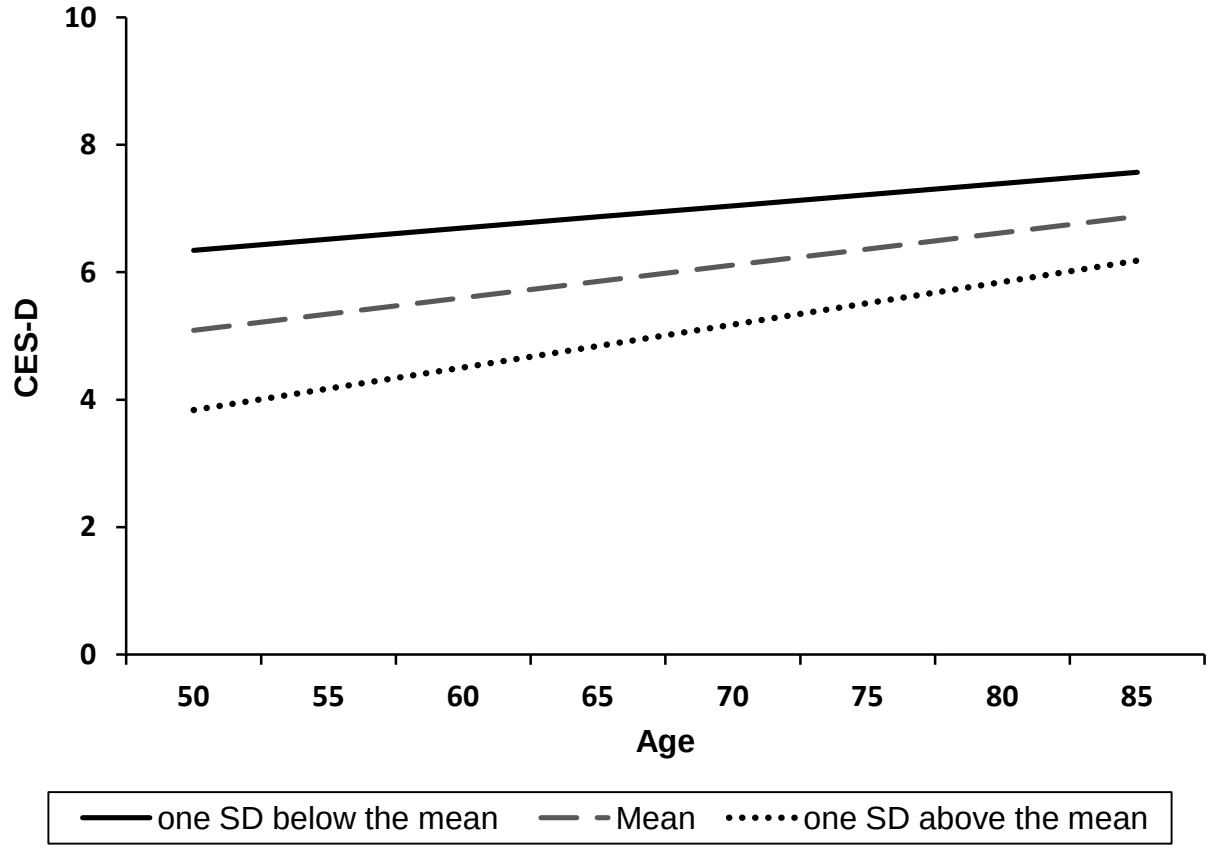
Notes. [1] All models control for marital status, residential area, co-residence with children, number of living children, and having a child under age 25 (results not shown) in addition to gender and the education variable specified. Prior to model fitting, measures of each family member's education were standardized (to mean = 0 and standard deviation [SD] = 1)

[2] The intercept can be interpreted as the mean CES-D scores at age 65 for respondents who are in the reference group for each of the categorical variables (men, no spouse/partner, lives in an urban area, not living with children, no child under age 25) and who have mean values for continuous variables (average number of living children and mean levels of schooling for each family member).

[3] Model 5 includes an age interaction with children's education but not age interactions with other family members because those interactions were not significant.

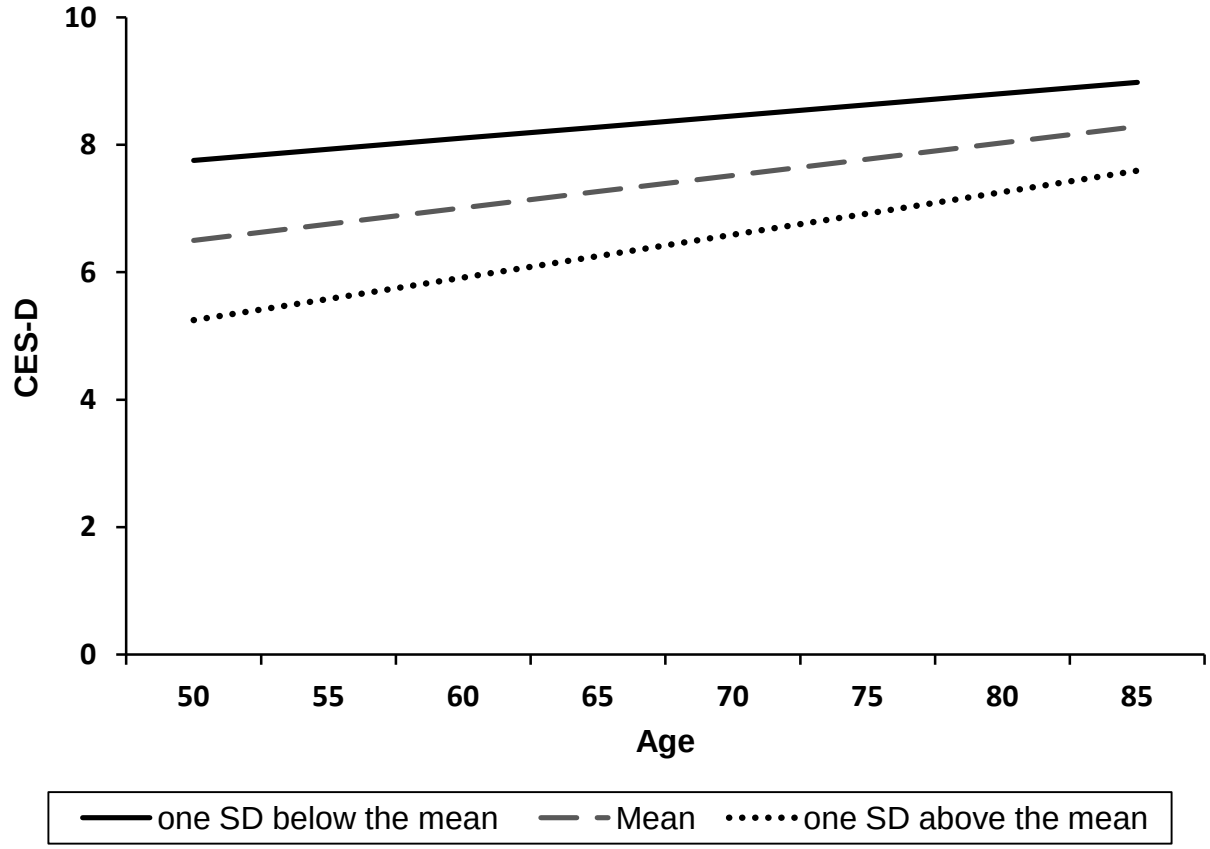
*p < .05, **p < .01, ***p < .001

Figure 1. Age Trajectories of Depressive Symptoms by Children's Education: Growth Curve Model Estimates for Men



Notes. Figure 1 is based on Model 5 in Table 3. The estimated values represent the predicted CES-D score at each age for men who were in the reference group each of the categorical variables (no spouse/partner, lives in an urban area, not living with children, no child under age 25) and who have mean values for continuous variables (average number of living children and mean levels of schooling for each family member).

Figure 2. Age Trajectories of Depressive Symptoms by Children's Education: Growth Curve Model Estimates for Women



Notes. Figure 2 is based on Model 5 in Table 3. The estimated values represent the predicted CES-D score at each age for women who were in the reference group each of the categorical variables (no spouse/partner, lives in an urban area, not living with children, no child under age 25) and who have mean values for continuous variables (average number of living children and mean levels of schooling for each family member).