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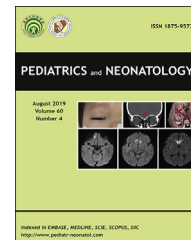Follow this and additional works at: https://commons.und.edu/sw-fac

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Original Article

Effects of childhood adversity and resilience on Taiwanese youth health behaviors

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Background: Adverse childhood experiences (ACEs) can leave negative impacts on one's health behaviors or social functioning later in life. Resilient characteristics have been shown to mitigate effects against risk behaviors in developing adolescents. However, clinical and research attention has rarely been given to jointly consider the effects of ACEs and resilient characteristics on health behaviors in Taiwanese youth.
Method: A total of 200 individuals aged 15−22 years were recruited from primary care settings, communities, and schools. Participants completed questionnaires assessing their ACEs, resilient characteristics, and health behaviors. Univariate analysis was firstly used to describe the correlates of ACEs and resilient characteristics. Further multivariate logistic regression analysis was used to examine the association of both factors with health behaviors.
Results: More than half (61.5%) of those surveyed had been exposed to at least one category of ACE. Verbal (37%) and physical (21%) abuses were the most common types of ACEs. The counts in the ACE categories were associated with being involved in physical fights (odds ratio 1.28 [confidence interval 1.01−1.63]), property damage (1.29 [1.03−1.61]), running away from home (1.30 [1.05−1.60]), bullying victimization (1.37 [1.16−1.61]), and sleep problems/

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tiredness (1.25 [1.03−1.52]). Meanwhile, resilience scores were associated with decreased odds of infrequent seatbelt use (0.47 [0.23−0.97]), low fruit and vegetable intake (0.42 [0.21−0.86]) unsatisfied body image (0.46 [0.22−0.97]), and sleep problems/tiredness (0.37 [0.18−0.79]).

Conclusions: ACEs and resilience characteristics play a significant role in shaping youth health behaviors. Further research should be undertaken to identify ways to build resilience against health risks in youth with prior ACE exposure.

1. Introduction

Adolescence is a critical period of physical and psychosocial transition, where health behaviors significantly contribute to lifelong health outcomes. From the perspective of preventive medicine, when consulting with adolescents it is important to carry out complete psychosocial assessments, according to several screening guidelines endorsed by the American Medical Association (Guidelines for Adolescent Preventative Services) and the American Academy of Pediatrics (Bright Futures Guidelines for Health Supervision of Adolescents).[1,2] For example, an instrument with an acronym HEADSS is commonly used to perform such assessments exploring the domains of Home, Education/employment, Activities, Drugs/alcohol, Sexual health and Suicidality in young people.[3] Obtaining a comprehensive profile of youth health risk behaviors helps health professionals engage and build rapport with young people in areas of concern,[3] which is crucial to guide the transition into a healthy and socially adapted adulthood.

Childhood adversity is usually defined by the occurrence of experiences, including, but not limited to, parental mental illness, household financial strains, loss of loved family members, maltreatment, and trauma, and these may have a negative impact on normal development or social functioning in adulthood.[4] In a longitudinal study, 6% of Taiwanese schoolchildren reported at least one family adversity before age 12 and these adverse childhood experiences (ACEs) appeared to contribute to depression in adolescence.[5] The prevalence rate of ACEs could be disproportionately high among alcoholic inpatients (around 90%), and each 1-unit increase was linked to a 61% likelihood of a suicide attempt.[6] Empirical research has linked ACEs to low self-esteem and high social anxiety in adolescents.[7] Severe forms of ACEs, like physical abuse, were associated with later post-traumatic stress disorders and behavioral problems in college students.[8] However, data showed that some of these individuals were able to exhibit resilience, bouncing back from their disadvantaged backgrounds.[9]

Resilience refers to a mental process through which individuals can overcome unfavorable circumstances without becoming physically and/or emotionally dysfunctional.[9] Resilient individuals are sensitive and maintain a positive attitude toward adversity, which makes them bounce back easily.[10] Conversely, vulnerable youths are likely to be subject to adverse contextual cues and thus develop risk behaviors. Evidence from research conducted in Western societies has demonstrated the mitigating effect of resilience characteristics in relationship to the development of health risk behaviors in adolescence.[9,10] Nonetheless, investigations on the interaction between resilient abilities and childhood adversity and their subsequent effects on youth health behaviors are limited in Taiwan. From a developmental perspective, understanding the process by which health behaviors emerge from early contextual exposure is critical in the development of prevention or proactive intervention measures.

In this study, we attempted to examine the effects of childhood adversity and resilience on health behaviors in Taiwanese youth. We hypothesize that childhood adversity is positively linked and resilience is inversely linked to the occurrence of health-compromising behaviors.

2. Materials and methods

2.1. Subject

Individuals aged 15−22 years were recruited voluntarily from the primary care setting, communities, and schools via research announcements. Those who were diagnosed with mental illness (e.g., bipolar disorder, major depression and schizophrenia) or major physical diseases (e.g., congenital syndromes, mental retardation and epilepsy) were excluded. For reasons of convenience, the recruitment took place in Tainan City and adjacent municipalities, which include urban and rural living contexts in the southwest of Taiwan. Participants were asked to complete questionnaires regarding their childhood experiences, resilient attitudes, and health behaviors with guaranteed confidentiality. They had the right to leave the study at any time and might be provided with appropriate consultations if any emotional disturbances were evoked by sensitive questions. All the procedures were approved by the Institutional Review Board of the National Cheng Kung University Hospital.

2.2. Adverse childhood experiences

A modified questionnaire based on the Adverse Childhood Experience International Questionnaire was applied for this study.[11] The tool included a total of 14 questions on different ACEs, ranging from family environment, childhood

maltreatment, and domestic calamity. Answers were dichotomized for each ACE type. Then the total ACE counts were calculated and categorized into three groups: none, only one, and more than one, in order to keep in line with previous research on accumulative effects of ACEs.[5]

2.3. Resilient characteristics

The Chinese version of the Inventory of Adolescent Resilience has previously been developed and validated among a group of Taiwanese adolescents.[12] This 4-point scale capturing four main aspects regarding youth resilience ($\alpha = 0.899$), namely problem solving and cognitive maturity ($\alpha = 0.704$), hope and optimism ($\alpha = 0.877$), empathy and interpersonal interaction ($\alpha = 0.906$), and emotional regulation ($\alpha = 0.778$), was reported by the surveyed participants.

2.4. Youth health behavior checklist

The questionnaire on the youth health behaviors and issues in this study was adopted from the adolescent physical and psychological well-being checklist originally used by Taiwan's youth-friendly health services.[13] The items were further modified according to published guidelines for adolescent and youth preventive health risk assessments.[1,14] We invited a panel of experts in the field of adolescent medicine and development to evaluate the appropriateness of the questionnaire for use in local clinical and community settings.[15] A 3-point Likert scale was applied to rate the frequency of these behaviors from 1 (never) to 3 (always). The internal consistency represented by Cronbach α was 0.717 for these questions (Table S1). To reduce the dimension of items listed in the behavior checklist for the purpose of analysis, we conducted exploratory factor analysis with the Varimax rotation to extract clusters. Only the questions in the clusters with acceptable internal consistency (Cronbach $\alpha > 0.7$) were grouped. The behavioral outcomes examined in this study were substance use (alcohol and cigarettes), delinquency and violence (social violence, property damage, and running away from home), exercise and safety (low physical activity, infrequent helmet and seatbelt use, and dangerous driving/riding), sexual behaviors (unprotected sex and one-night stands via the Internet), diet and body image (unsatisfied body image, low fruit and vegetable intake, unhealthy weight control and height promotion), bullying victimization, and tiredness/sleep problems.

2.5. Covariates

The covariates included age, gender, parental education, household financial status, family support, and self-rated well-being. Parental education was categorized according to the highest educational level attained by either parent. Household financial status was assessed by the following two questions: "How do you define your household financial situation?" and "Do you think that your pocket money is sufficient to use?" Answers reported on a 4-point scale ranging from 1 (very poor/insufficient) to 4 (very rich/sufficient) were summed up and regrouped into three

categories: "less affluent (scores 2 to 4)", intermediate (scores 5 to 6)", and "affluent (scores 7 to 8)". The family support scale, adopted from the adolescent physical and psychological well-being checklist, consisted of a total of 6 questions ($\alpha = 0.820$) on a 3-point scale from 1 (rare) to 3 (usually) that assessed the frequency that familial support participants received for their concerns and worries, an adequate food supply, care and respect, trust and confidentiality, activity and development, and empathy.[13] A score for subjective well-being, represented by the summarized scores for self-rated health and life satisfaction, was rated on a 4-point scale from 1 (very unhealthy or unsatisfied with life) to 4 (very healthy or satisfied with life). The sums of scores for questions were regrouped into three categories: "poor" (scores 2 to 4), "intermediate" (scores 5 to 6), and "good" (scores 7 to 8).[16]

2.6. Statistical analysis

Analysis was performed using the SPSS software (version 17.0, SPSS, Inc., Chicago, IL). Demographic information and the frequency of ACEs among participants were characterized using descriptive statistics. Resilience scores for the participants of different demographic and ACE strata were compared by independent t-tests and analyses of variance (ANOVAs). Multivariate logistic regression analysis was performed to evaluate the impacts of ACE counts and resilience scores on the occurrence of youth health behaviors, where both factors were treated as continuous variables for analytic purposes. Odds ratios (OR) with 95% confidence intervals (CI) were demonstrated with statistical significance, producing a two-sided p-value of <0.05.

3. Results

Among 283 adolescents approached and assessed for recruitment eligibility, a total of 200 gave their written consent and completed the questionnaires (Fig. 1). These recruited subjects had an average age of 20.3 (± 1.7) years (Table 1). Among them, 65% were males; 36.3% had parental education of college or above; 9% had less affluent household financial status; 5% had weak family support; and 8.5% had poor self-rated well-being. Regarding their ACEs, 28% of the participants had undergone one type of ACE, and 33.5% had undergone two or more than two types of ACEs. More ACE counts were correlated with less family support ($p < 0.05$) and lower self-rated well-being ($p < 0.05$).

The common ACEs with a significant prevalence greater than 10% among the population surveyed were verbal abuse (37%), physical abuse (21%), alcohol use of household member, (15.5%), death of household member (16.5%), parental separation (14%), and being a witness to domestic violence (12.5%). As to the relationship between ACE types and the overall counts, malicious injury and illicit drug use were the two most important types that were exclusively found in those having at least four ACE counts, while individuals with an ACE type that involved witnessing domestic violence, incarceration, or the mental illness of household members were each found to have more than two ACE counts (Fig. 2).
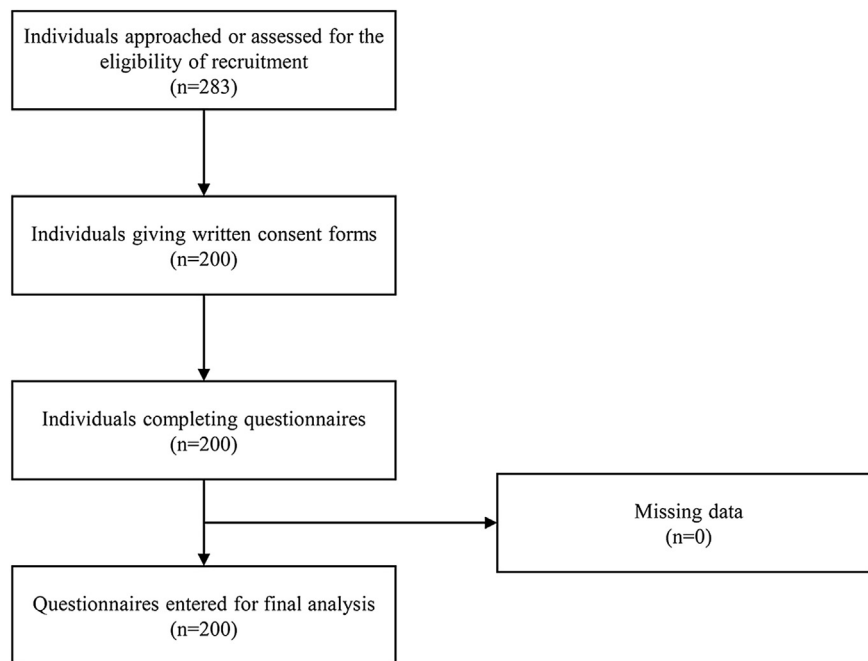
Figure 1 Flow chart of the enrollment.

The overall and subdomain of resilience scores were summarized in Table 2. Lower overall resilience was more likely to be observed in females (p < 0.05) and those with poor self-rated well-being (p < 0.001) and more ACE counts (p < 0.01). Similar results were found in all the subdomains except interpersonal relationships. Concerning other covariates, family support was associated with the overall resilience and optimism subdomain.

The most common health-compromising behaviors and health issues in our sample (Table 3) were unsatisfied body image (64.5%), low physical activity (64%), alcohol drinking (61%), sleep problem/tiredness (58%), low fruit and vegetable intake (52.5%), infrequent seatbelt use (43%), infrequent helmet use (30%), bullying victimization (27.5%), and cigarette smoking (26.5%). Regression analysis found that the greater the ACE count reported by individuals, the higher the odds ratios were of certain health-compromising behaviors. These odds ratios were significant for social violence (OR = 3.68, 95%CI 1.75—7.74), property damage (OR = 1.29, 95% CI 1.03—1.61), running away from home (OR = 1.30, 95%CI 1.05—1.60), bullying victimization (OR = 3.06, 95%CI 1.96—4.79), and sleep problem/tiredness (OR = 1.25, 95% CI 1.03—1.52). Meanwhile, higher resilience was related to lower odds ratios for infrequent seatbelt use (OR = 0.47, 95% CI 0.23—0.97), low fruit and vegetable intake (OR = 0.42, 95% CI 0.21—0.86), unsatisfied body image (OR = 0.46, 95% CI 0.22—0.97), and sleep problem/tiredness (OR = 0.37, 95%CI 0.18—0.79).

4. Discussion

In this cross-sectional sample of Taiwanese youth, more than half (61.5%) had been exposed to at least one ACE. The leading ACE types were verbal abuse (37%) and physical abuse (21%). These rates were comparable to previous Taiwanese reports,[7,8,17] but much higher than those found in the UK and US.[18,33] Despite the enactment of child protection laws and mandatory maltreatment reporting, corporal punishment is commonly regarded as a legitimate instead of abusive form of parental discipline that remains within a private range beyond the public child protection authority.[19] Cultural differences in parental values and practices differentiate the patterns of childhood maltreatment.[20] When analyzing the relationship of different ACE types, we observed that malicious injury and illicit drug use of household members were exclusively found in those having at least four ACE counts. It is shown that multiple ACEs are highly interrelated and the cumulative effects of multiple ACEs are evident on consequent psychological and behavioral health.[21] These two types of ACEs, although low in prevalence, should be seriously considered as indicators of multiple ACEs and further psychosocial assessment and intervention should be provided as necessary.

As to the relationship between ACEs and resilience, our study found that these two factors were negatively associated. This finding is contradictory to previous arguments for the "stress inoculation-induced resilience" hypothesis, which proposes that early-life stress experiences can promote more adaptive emotional and cognitive development and thus lead to better stress-coping skills against adversities later in life.[22] Recent research efforts have been undertaken to identify factors determining why some people develop adaptive capacities and others do not. One of the key factors is having a supportive environment, either through parents, care givers or other trusted adults that surround the child faced with adversity.[23] In our sample, ACE counts were higher in those who generally lacked family support. Without sufficient contextual support, these children facing adversities may

Table 1 Demographic information and frequency of ACEs among participants.

	Overall (N = 200)	ACE counts			
		0 (N = 77)	1 (N = 56)	2+ (N = 67)	p-value
Age, years					
≤20	102 (51.0)	44 (57.1)	24 (42.9)	34 (50.7)	0.266
>20	98 (49.0)	33 (42.9)	32 (57.1)	33 (49.3)	
Gender					
Male	130 (65.0)	52 (67.5)	36 (64.3)	42 (62.7)	0.824
Female	70 (35.0)	25 (32.5)	20 (35.7)	25 (37.3)	
Parental Education[a]					
Junior high school or below	13 (6.7)	4 (5.4)	6 (10.9)	3 (4.7)	0.522
Senior high school	110 (57.0)	46 (62.2)	28 (50.9)	36 (56.3)	
College or above	70 (36.3)	24 (32.4)	21 (38.2)	25 (39.1)	
Household financial status					
Less affluent	18 (9.0)	2 (2.6)	8 (14.3)	8 (11.9)	0.107
Intermediate	145 (72.5)	57 (74.0)	40 (71.4)	48 (71.6)	
More affluent	37 (18.5)	18 (23.4)	8 (14.3)	11 (16.4)	
Family support					
Weak	10 (5.0)	3 (3.9)	2 (3.6)	5 (7.5)	0.012
Intermediate	66 (33.0)	15 (19.5)	22 (39.3)	29 (43.3)	
Strong	124 (62.0)	59 (76.6)	32 (57.1)	33 (49.3)	
Self-rated well-being					
Poor	17 (8.5)	3 (3.9)	4 (7.1)	10 (14.9)	0.012
Intermediate	134 (67.0)	47 (61.0)	39 (69.6)	48 (71.6)	
Good	49 (24.5)	27 (35.1)	13 (23.2)	9 (13.4)	

ACE indicates adverse childhood experience.
The value represents counts of ACE (%).
[a] Missing values were not included in the denominator.

not be able to adapt themselves to develop stress-coping resilience. This might explain in part the negative association between ACEs and resilience in our research. The implications of this finding should encourage research on the development of a stable set of relationships that promote resilience and the effect which these stable relationships have in mitigating the negative impacts of ACEs on affected children and youth.

Despite the emerging role of pediatricians and healthcare providers in adolescent health assessment and promotion, recommended annual systemic and structural psychosocial evaluations of adolescents are rarely
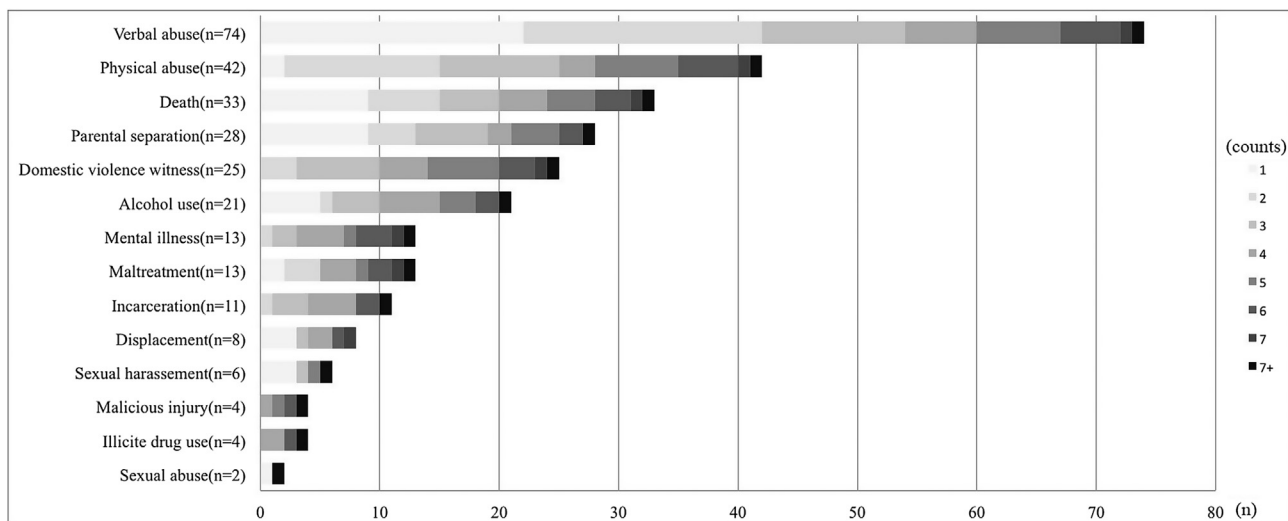

Figure 2 The prevalence of each ACE category stacked by counts of ACE category. Note: ACE indicates adverse childhood experience. The counts of ACE category were represented by a grey scale with a darker tone indicating more counts. Some subjects may have multiple counts of ACE category.

Table 2 Resilience scores in the participants of different demographic and ACEs strata.

	Overall resilience	Problem solving	Optimism	Interpersonal relationship	Emotional adjustment
Age, years					
≤20	3.03 ± 0.46	3.03 ± 0.51	3.00 ± 0.64	3.21 ± 0.53	2.87 ± 0.65
>20	3.06 ± 0.39	3.10 ± 0.47	2.91 ± 0.59	3.34 ± 0.42	2.90 ± 0.63
p-value	0.613	0.329	0.275	0.060	0.721
Gender					
Male	3.10 ± 0.44	3.12 ± 0.50	3.05 ± 0.59	3.27 ± 0.49	2.95 ± 0.65
Female	2.94 ± 0.40	2.96 ± 0.46	2.78 ± 0.64	3.27 ± 0.48	2.76 ± 0.60
p-value	0.014	0.022	0.003	0.959	0.043
Parental Education					
Junior high school or below	2.93 ± 0.47	2.97 ± 0.34	2.72 ± 0.76	3.27 ± 0.45	2.74 ± 0.78
Senior high school	3.04 ± 0.44	3.05 ± 0.48	2.97 ± 0.62	3.26 ± 0.51	2.88 ± 0.67
College or above	3.07 ± 0.40	3.11 ± 0.53	2.98 ± 0.59	3.26 ± 0.46	2.93 ± 0.57
p-value	0.585	0.537	0.386	0.999	0.601
Household financial status					
Less affluent	3.08 ± 0.44	3.14 ± 0.81	2.97 ± 0.63	3.37 ± 0.41	2.79 ± 0.67
Intermediate	3.00 ± 0.41	3.03 ± 0.40	2.90 ± 0.60	3.24 ± 0.49	2.86 ± 0.62
More affluent	3.16 ± 0.49	3.18 ± 0.58	3.15 ± 0.66	3.35 ± 0.51	3.01 ± 0.67
p-value	0.125	0.191	0.102	0.304	0.341
Family support					
Weak	3.13 ± 0.43	3.11 ± 0.49	3.05 ± 0.55	3.17 ± 0.55	3.16 ± 0.61
Intermediate	2.91 ± 0.35	2.95 ± 0.52	2.75 ± 0.56	3.18 ± 0.41	2.78 ± 0.60
Strong	3.11 ± 0.45	3.12 ± 0.47	3.06 ± 0.63	3.33 ± 0.51	2.91 ± 0.66
p-value	0.007	0.066	0.004	0.100	0.152
Self-rated well-being					
Poor	2.88 ± 0.53	2.99 ± 0.47	2.49 ± 0.90	3.24 ± 0.56	2.75 ± 0.68
Intermediate	2.97 ± 0.38	2.96 ± 0.41	2.89 ± 0.56	3.23 ± 0.48	2.82 ± 0.61
Good	3.29 ± 0.41	3.36 ± 0.57	3.29 ± 0.49	3.39 ± 0.47	3.11 ± 0.67
p-value	<0.001	<0.001	<0.001	0.143	0.014
ACEs counts					
0	3.14 ± 0.44	3.14 ± 0.42	3.12 ± 0.58	3.28 ± 0.48	3.02 ± 0.70
1	3.06 ± 0.39	3.13 ± 0.54	2.96 ± 0.54	3.31 ± 0.48	2.86 ± 0.63
2+	2.91 ± 0.42	2.93 ± 0.49	2.76 ± 0.67	3.22 ± 0.50	2.74 ± 0.56
p-value	0.006	0.019	0.002	0.530	0.030

ACE indicates adverse childhood experience. The value denotes the average score ± standard deviation.

practiced in clinical settings.[13] Using a structured youth health behavior checklist, we identified several health-compromising behaviors and issues that may warrant health professionals' attention. First, 64.5% of participants reported being unsatisfied with their appearance. This matched scores for unhealthy weight control and height promotion behaviors in the factor analysis. The findings in the frequency analysis might be interpreted as a sensitive problem of self-esteem, because modern and changing beauty standards prevail in this population. Previous research has suggested that individuals who are emotionally adjustable and conscientious are more likely to develop higher self-esteem as they move smoothly through life.[24] Our results were consistent with this prior research in that those participants in our study who had higher resilience were more satisfied with their physical appearance. Further research should be carried out to identify ways in which efforts to improve self-acceptance mitigate negative impacts on adolescent development.

Second, low physical activity and fruits/vegetables intake were reported by more than half of the participants.

It appeared that the risk of inadequate fruits and vegetable intake could be reduced by as much as 40% in resilient subjects. Obesity is one of the most important health consequences related to this issue.[25] Previous research has found that some personal (e.g. nutrition knowledge) and contextual (e.g. family support) factors could help to build healthy eating habits and these behavioral determinants could be translated into resilience to obesity.[26,27] As unhealthy nutritional practices and physical inactivity are prevalent in the young population, proactive measures promoting healthy lifestyles should be seriously considered in adolescent counseling.[28] Also, 58% of the participants in our study reported always feeling tired or having sleep problems. These rates were higher than those found in a prior survey conducted on Taiwanese college freshmen a decade ago.[29] Sleep problems, either because of difficulty in falling asleep or because of waking up frequently, have consistently been reported in a certain percentage of school children throughout adolescence.[30] In our cohort, we found that sleep problems were positively associated with ACE counts and negatively associated with resilient

Table 3 Logistic regression analysis of effects of ACEs and resilience on adolescent behavioral outcomes.

Behavioral outcomes	Overall prevalence (%)	ACE counts		Resilience scores	
		OR (95% CI)	p-value	OR (95% CI)	p-value
Substance use					
Cigarette smoking	26.5	1.08 (0.90–1.29)	0.403	1.32 (0.59–2.94)	0.505
Alcohol drinking	61.0	1.19 (0.99–1.43)	0.062	1.57 (0.78–3.18)	0.207
Delinquency and violence					
Fight participating	7.5	1.28 (1.01–1.63)	0.041	2.02 (0.54–7.60)	0.298
Property damaging	9.0	1.29 (1.03–1.61)	0.027	0.82 (0.23–2.88)	0.757
Running away from home	11.5	1.30 (1.05–1.60)	0.017	0.54 (0.17–1.70)	0.289
Exercise and safety					
Low physical activity	64.0	1.07 (0.90–1.27)	0.463	0.65 (0.31–1.34)	0.243
Infrequent helmet use	30.0	1.08 (0.94–1.30)	0.400	0.62 (0.29–1.33)	0.221
Infrequent seatbelt use	43.0	1.10 (0.43–1.84)	0.241	0.47 (0.23–0.97)	0.041
Dangerous driving/riding	15.5	1.15 (0.95–1.39)	0.152	0.39 (0.14–1.04)	0.060
Sexual behaviors					
Unprotected sex	13.5	0.79 (0.57–1.09)	0.143	0.84 (0.23–3.08)	0.794
One-night stand via Internet	1.0	1.13 (0.54–2.36)	0.739	0.01 (0.00–6.12)	0.149
Diet and body image					
Low fruit and vegetable intake	52.5	1.04 (0.88–1.22)	0.663	0.42 (0.21–0.86)	0.017
Unsatisfied body image	64.5	1.09 (0.91–1.31)	0.338	0.46 (0.22–0.97)	0.042
Unhealthy weight control	19.5	1.12 (0.92–1.36)	0.269	0.97 (0.39–2.42)	0.947
Unhealthy height promotion	26.0	1.01 (0.84–1.20)	0.945	0.46 (0.21–1.02)	0.057
Bullying and Sleep					
Bullying victimization	27.5	1.37 (1.16–1.61)	<0.001	0.60 (0.27–1.37)	0.227
Sleep problem/tiredness	58.0	1.25 (1.03–1.52)	0.022	0.37 (0.18–0.79)	0.010

ACE indicates adverse childhood experience; OR odds, ratio; CI, confidence interval.

characteristics. This finding was in accordance with prior research documenting significant associations between sleep disorders and subjects with a history of childhood adversity, including a graded relationship with the number and severity of adverse experiences.[29] It has been suggested that the rapid-eye-movement sleep involved in emotional memory processing may be impaired among subjects who have been exposed to trauma.[31] Interestingly, resilient individuals could be distinguished by having higher right frontal theta activity during rapid-eye-movement sleep.[31] Further research focusing on the molecular functions related to resilient characteristics may affirm the epidemiological link found in our study.

Delinquent and violent behaviors have been universally found to be critically associated with childhood adversity. In a different social context, Bellis et al. found that persons exposed to four or more ACE types, compared to those who had experienced none, had increased health risks for early sexual initiation, smoking, binge drinking, drug use, violence victimization, violence perpetration, and incarceration.[18] This malicious link may ultimately lead to the development of cardiovascular disease, cancer, chronic lung disease, and diabetes in adults.[32] However, in our study no such kind of association was found between ACEs and adolescent substance use. The reason may be that our cohort was a mixed sample recruited from primary care and community settings, which did not capture those experiencing high magnitudes of ACE as compared to, for instance, target sampling of incarcerated youths. Selection bias may exist and should be taken into account when interpreting the results, as the convenient sample used in this study was limited by its small number of recruits. Some other influential factors, like age accumulative effects, peer influence, economic ability, and the availability of cigarettes and alcohol, should be included in further ACE research to unpack the interplay among ACEs and problems with alcohol/cigarette use.[33]

Previous research has supported the hypothesis that resilience characteristics mitigate the risk for the development of risky health behaviors in adults when there has been exposure to childhood abuse or other traumatic experiences.[34] Our results unexpectedly showed that resilient characteristics were not protective against these risks in this category of youth. Aligned with our finding, one Turkish study showed that the mean resilience scores were significantly higher in cigarette and alcohol users than those in nonusers.[35] Similar negative results relating to the impact of compensatory and protective models of resilience on substance use was found in another study from Brazil.[36] Dissecting these findings, we would speculate that substance use serves as a self-soothing process in response to distressing psychological states, thus cancelling the protective effects of resilience.[37] From a practical perspective, youth exposed to ACEs should be advised to pursue healthier strategies, like exercise or seeking for help, in order to cope with stress or the adverse impacts associated with adversity.

There are some limitations in the study. First, health-compromising behaviors and ACEs may be under-reported because of their social undesirability. Second, the ACEs counted were not necessarily based on their severity, which may not fully capture the cumulative adverse dosage effect

of ACEs on adolescent development and behaviors. Finally, the participants recruited in our study were generally late adolescents or young adults living in the southern region of Taiwan. The profile of health behaviors of this population may be different in younger age groups. Further research with a wider range of ages and systemic sampling of the nation-wide young population may be required for us to be able to make generalizations about implications that can be derived from our dataset.

5. Conclusions

The use of a standardized psychosocial health checklist helped to prioritize potential health issues requiring healthcare attention in youths. Our study suggests that childhood adversity is an important risk factor affecting the development of delinquent and violent behaviors, sleep problems, and bullying victimization. Meanwhile, resilient characteristics can protect youth from infrequent seatbelt use, low vegetable and fruit intake, maintaining an unsatisfied body image, and sleep problems. Further studies investigating ways to minimize the negative impact of childhood adversity and to build resilience are required, in view of their potential for health prevention and health promotion for Taiwanese youth. We may need multidisciplinary efforts from all stakeholders in youth development and health, including the government, social workers, healthcare practitioners, educators, and family members, to provide a healthy and friendly growing milieu for our children.

Conflicts of interest statement

The authors have no conflict of interest to declare.

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Appendix A. Supplementary data

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