The Relationship Between Fruit and Vegetable Intake and Resilience of College-Aged

Students with Histories of Childhood Maltreatment

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I'd like to dedicate my work to all the all the neglected, maltreated, and disenfranchised children of the world. To the survivors of such atrocities, you are my inspiration. Your bravery, strength, tenacity, and resilience are unmatched. I hope my work in this project and in future projects will help you and generations to come. We are in this fight together: you are not alone.

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Abstract

This study set out to examine the relationship between positive nutrition (as function of fruit and vegetable intake) and level of resilience in college-aged students with histories of maltreatment. A secondary route of investigation set out to explore if maltreatment severity (as a function of frequency) mediated the relationship between positive nutrition and level of resilience. A set of survey data was given to approximately 90 students. No significant relationships were found among any of the variables of interest.

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Introduction

Childhood maltreatment, sometimes referred to as childhood trauma or adverse childhood experiences, is a public health concern that has been extensively studied in the literature. However, definitions of child maltreatment often vary. Chandler and colleagues (2015) define child maltreatment as household dysfunction, neglect, and/or abuse. The World Health Organization's (2020) definition of maltreatment is "…all types of physical and/or emotional ill-treatment, sexual abuse, neglect, negligence and commercial or other exploitation..." (para. 1). Researchers have developed a number of screeners or assessment tools in order to assess child maltreatment. Felitti and colleagues (1998) developed the Adverse Childhood Experiences (ACE) Scale, which assesses for previous physical, sexual, and psychological abuse as well as household dysfunction. Higgins and McCabe (2001) developed a scale that separates maltreatment into five subgroups and includes a number of questions that assess for the presence of specific types of maltreatment: family violence, neglect, psychological maltreatment, physical abuse, and sexual abuse. Due to its comprehensive approach, Higgins and McCabe's model of maltreatment will be the framework for defining maltreatment for the current study.

The prevalence of child maltreatment is staggering. According to the Child Maltreatment Report of 2020, the childhood victimization rate in the United States was estimated at 618,000, which is significantly less than in the 2019 report which was 656,000 (U.S. Department of Health & Human Services, 2022). The report also found that an estimated 1,750 children died as a direct result of abuse or neglect in 2020, as compared to 1,840 in 2019 (U.S. Department of Health & Human Services, 2021; U.S.

Department of Health & Human Services, 2022). Though a decrease was found in both instances of child maltreatment and fatalities, the "reduction" is likely due to the COVID-19 pandemic. As the report points out, the largest group of mandated reporters, educators, were unable to witness, and subsequently report, suspected maltreatment, leading to significant underreporting of cases (U.S Department of Health & Human Services, 2022). According to the 2019 report, child maltreatment referral rates have been on the rise since 2015 (U.S. Department of Health & Human Services, 2021). Notably, the figures presented in the Child Maltreatment Report involve cases that have been reported to Child Protective Services (CPS). Child maltreatment, especially child sexual abuse, is thought to be highly underreported. Unreported cases notwithstanding, the statistics reveal that child maltreatment is a significant problem in America that poses a public health threat.

Negative Health Impacts of Child Maltreatment

There are many potential maladaptive physical and mental health outcomes associated with experiencing childhood maltreatment, which often follow the individual into adulthood. Childhood maltreatment has been associated with a number of mental health disorders in adulthood, including posttraumatic stress disorder, depression, substance abuse and panic disorder (Dye, 2018; Humphreys et al., 2020). Moreover, a meta-analysis conducted by Humphreys and colleagues (2020) found that greater depression symptomology was a function of child maltreatment severity. Eating disorders, conduct disorder, self-injurious behavior, and aggression have also been associated with maltreatment in childhood (Dye, 2018).

Many studies have focused on the relationship between childhood maltreatment and later health outcomes. According to a meta-analysis conducted by Petruccelli and colleagues (2019), there exists a graded relationship between ACE scores and certain health outcomes. In other words, higher ACE scores are associated with greater likelihoods of negative health outcomes. Physical health outcomes associated with higher ACE scores include heart disease, sleep disorders, and respiratory issues (Petruccelli et al., 2019).

Notably, not all who have experienced childhood maltreatment will experience later negative health outcomes. Some individuals appear to have protective factors of sorts that serve as a buffer against maladaptive outcomes (Chandler et al., 2015; Haskett et al., 2006). These protective factors can be viewed from the framework of one's level of resilience. The concept of resilience has fascinated researchers and spurred a boom of research in this area. Like child maltreatment, several definitions of resilience are found in the literature. A number of definitions refer to specific characteristics (see below) thought to promote resilience (e.g. Connor & Davidson, 2003; Wagnild & Young, 1993). One commonly used measure of resilience in the literature, the Connor-Davidson Resilience scale, breaks resilience into five factors ranging from personal competence and tenacity to spiritual influences (Connor & Davidson, 2003). The characteristics included in Waginald and Young's Study (1993) are as follows: equanimity, perseverance, self-reliance, meaningfulness, and extensional aloneness. For the purpose of this study, resilience is defined as an individual's ability to "bounce back or recover from stress" from here on referred to as recover from stress (Smith et al., 2008, p. 199).

According to Connor and Davidson (2003), "resilience is modifiable and can improve with treatments" (p. 81). If resilience can be improved, it would be an invaluable tool in the fight against the adverse mental and physical health outcomes associated with childhood maltreatment. Previous studies have evaluated methods such as mindfulness and its impact on health outcomes (Creswell et al., 2019; Poulin et al., 2008). Although resilience has been widely studied in the literature, less is understood about the potential associations between nutrition and resilience.

Nutrition and Resilience

According to the literature, there is a relationship between resilience, nutrition, and mental health outcomes, but the details and directionality of the relationship are unclear. The literature suggests that increased fruit and vegetable intake is associated with better health outcomes and lower psychological distress (Bohem et al., 2018; Wattick et al., 2018; Rooney et al., 2013; Richard et al., 2015; Lui et al., 2016). Drawing from this literature, the current study operationalized healthy nutrition as level of consumption of fruits and vegetables (e.g., positive or healthy nutrition equals greater consumption of fruits and vegetables). The knowledge that resilience and positive nutrition have been found to have a positive relationship with health outcomes warrants further investigation.

According to Yousafzai and colleagues (2013), positive nutrition alone does not foster resilience but is potentially effective at fostering resilience when combined with psychosocial stimulation in the form of childhood developmental interventions (i.e. family care practices, parent-child interactions, responsive feeding). Boehm and colleagues suggest that those with better psychological well-being are more likely to

consume fruits and vegetables (Boehm et al., 2018). The opposing findings and overall ambiguity throughout research reflect the need for further investigation. To the author's knowledge, no study has focused on the possibility that positive nutrition is an indirect factor to mental health outcomes but a direct factor to resilience.

College Students' Retrospective Maltreatment

Hammen and colleagues (2000) found support for the idea that stress-sensitization, or the consistent presence of early life stressors, lowered an individual's subsequent threshold for stress, making them more vulnerable to the negative effects of stress. Danese and McEwen (2011) described the concept of allostatic load, which, in short, is the cumulative effect over time of stress on areas of the brain. Chronic stress increases the allostatic load, which has implications for our immune system and overall health (Danese & McEwen, 2011). Danese and McEwen (2011) highlight that stress experienced in sensitive periods of development (i.e. childhood) may also impact allostatic load, further supporting the importance of addressing incidence and severity when measuring maltreatment.

It is well known that college students experience high levels of stress, which put them at risk for poor mental health outcomes (Wattick et al., 2018). College presents different stressors that students must learn to navigate and cope with. It is a time for adjustment, and for many students this is the first time they are away from their parents, which places more responsibility on them (Ross et al., 1999). Deadlines and expectations for academic achievement add to the list of daily stressors college students experience (Ross et al., 1999). Ross and colleagues (1999) conducted the Student Stress Survey and found that the top sources of stress as reported by students were the change in

responsibilities, eating and sleeping habits, workload, and breaks. Another stressor was addressed in Wattick and colleagues (2018) study, which suggests that college students are at risk for food insecurity and low-quality food intake.

Allostatic load and stress-sensitization paired with the high stress environments associated with college and marked by a variety of stressors acutely increases students' vulnerability to poor mental and physical health outcomes. The vulnerability of this population as expressed in the literature validates the merit of focusing on college students for the current study.

Thesis Statement

My research on child maltreatment has enlightened me to the magnitude of the problem through the vast prevalence and subsequent ripple effects. Investing time and resources to address this public health threat are of the utmost importance. Beyond the research, there are programs and organizations that work every day to intervene and change the course of children's lives.

In the U.S. one of the most prominent organizations in this fight is the Child Protective Services (CPS). CPS is overwhelmed with cases every day. CPS received an estimated 3,476,000 case referrals in 2019 and an estimated 3,145,000 case referrals in 2020 (U.S. Department of Health & Human Services, 2022). As previously noted, child maltreatment is grossly underreported. Given the prevalence and economic impact of child maltreatment, along with the burden of underreported cases, it is likely that there is an overwhelming dearth of resources to adequately support every individual who has experienced maltreatment. There are programs, such as therapy and Head Start, that have had excellent success, but they are often difficult to access and expensive to maintain. Other interventions require the support and participation of caregivers, which presents a new set of barriers to resource acquisition and access to treatment (particularly in the most severe cases of child maltreatment in which children are removed from the offending caregiver).

Resilience has always been a topic of interest for me for this very reason. If we could increase resilience on a large scale through interventions at public institutions such as schools, community centers, and day cares, we have the potential to give children who otherwise would fall through the cracks a protective tool against the negative outcomes

associated with maltreatment. Resilience could serve as a buffer for the prevention of future negative health outcomes and developmental cascades of mental health problems that we often see in individuals with histories of child maltreatment and adverse childhood experiences.

My approach in addressing this topic arose from my undergraduate training in both psychology and nutrition. Throughout my studies I realized that psychology and nutrition are interconnected. The food we consume has a direct impact on our body and mind which in turn affects our health, well-being and overall (mental and physical) functioning. I saw this project as an opportunity to dive deeper into the research and expand my knowledge on these concepts and relationships. I believe that better nutrition, measured through higher intakes of fruits and vegetables, will be positively correlated with level of resilience. A secondary hypothesis I would like to explore is if the relationship between nutrition and resilience is moderated by the experience and severity of child maltreatment. I believe the association between positive nutrition and resilience will be weaker if child maltreatment severity (as a measure of frequency) is greater.

This study aims to explore the following question: Are there associations among child maltreatment, resilience and positive nutrition? My hope for this study is to gain insight into a topic that thus far has produced mixed findings. Though causation or directionality cannot be concluded from a study style such as this, the hope is that the findings will direct and guide further and more controlled studies in this area if the results warrant doing so. The long-term goal is that this project and any future research it may spur will guide us to intervention methods that can increase resilience in at risk populations and prevent negative health outcomes.

Method

Participants

For this study 104 students were recruited using social media platforms. In addition to social media, participants were recruited through email and/or written announcements around campus. Nine participants were removed due to excessive incomplete data (over 50%). Of the remaining 95 three additional participants did not answer the attentional checks and were removed. The remaining 92 participants answered all the attentional checks correctly. After removing those with incomplete data and those who did not respond to the attentional checks, a total of 92 participants were included for analysis. A post hoc power analysis specified that the sample size of 92 with a medium effect size yielded adequate power (80%). Participants were asked a series of demographic questions including gender, age, ethnicity, and the type of degree they were currently obtaining. Participants were primarily female (65.6%), between the ages of 18 to 21 (61.3%), white/Caucasian (72%), and pursuing a bachelor's degree (81.7%). Full demographic data can be found in Table 1.

Table I

Demographics (n = 93)		
	N	Percent
Gender		
Male	21	22.6%
Female	61	65.6%
Non-binary	6	6.5%
I prefer not to respond	2	2.2%
Missing	3	3.2%
Age		
18 - 21	57	61.3%
22 - 25	16	17.2%
26 and older	17	18.3%
Missing	3	3.2%
Ethnic Background		

Demographics (n = 93)

	N	Percent
White/Caucasian	67	72.0%
Black/African American	8	8.6%
Asian	3	3.2%
Not Listed	1	1.1%
I prefer not to respond	4	4.3%
Missing	3	3.2%
Degree Obtaining		
Associate degree	2	2.2%
Bachelor's degree	76	81.7%
Master's or Doctoral degree	12	12.9%
Other	1	1.1%
Missing	2	2.2%

Measures

The research for this study was drawn from survey data obtained using Qualtrics. Institutional Review Board (IRB) approval for the current study was obtained through the IRB at Middle Tennessee State University.

Comprehensive Child Maltreatment Scale

After informed consent was obtained, the participants could begin the survey. This study employed Higgins and McCabe's (2001) Comprehensive Child Maltreatment Scale (CCMS). The CCMS is a retrospective self-report questionnaire. It is designed to be given to adults to assess for the presence of five distinct types of maltreatment that may have occurred in childhood. The five types of maltreatment included in the CCMS are: physical abuse, sexual abuse, neglect, psychological maltreatment, and witnessing family violence (Higgins & McCabe, 2001).

The measure is broken down into five subscales which assess various forms of maltreatment. Questions assess the frequency with which the experience occurred, as

well as if the respondent witnessed the type of maltreatment occurring to someone else. For example, the participants are asked to respond to three questions regarding physical abuse, which are then followed by "How frequently did you witness any of the behaviors listed in the previous question directed towards others in the family?" Response options are on a Likert scale and range from (0) never to almost never, (1) occasionally, (2) sometimes, (3) frequently, and (4) very frequently. Scores from each type of maltreatment are combined to obtain a composite score (Higgins & McCabe, 2001).

The CCMS is a well-tested measure that has been cited in over 150 articles. The original study tested internal consistency, test-retest reliability, and concurrent criterion-related validity. Concurrent criterion-related validity was assessed by giving participants the Child Abuse and Trauma (CAT) scale and then comparing CAT scores to CCMS scores. The CAT and CCMS neglect scales were strongly correlated ($r = .77$, $p < .001$). The sexual abuse subscales of each measure were strongly intercorrelated ($r = .87$, $p < .001$). Overall, CCMS showed concurrent-criterion related validity, the exception being the CCMS Witnessing Family Violence subscale. The Witnessing Family Violence subscale was not correlated with any CAT subscale or overall score, suggesting that this subscale is a unique factor measured by the CCMS but not measured by the CAT. Internal consistency was measured using Cronbach's alpha. The measure showed good internal consistency, $\alpha = .93$. Test-retest reliability (tests were given 6-8 weeks apart) was 0.92, which was arrived at after adjusting for a few items contributing to low test-retest reliability. In total 3 items were removed each pertaining to behaviors perpetrated by other adult or older adolescent (Higgins & McCabe, 2001). This drawback to test-retest

reliability should be controlled for in the current study as the questions were consolidated to assess behaviors of primary caregivers only.

In the CCMS, participants are asked to rate the frequency of which they experienced a number of child maltreatment experiences prior to the age of 13. The original CCMS probes for three responses to each item in regard to various caregivers in the individual's life (i.e. mother, father, other adult or older adolescent; Higgins & McCabe, 2001). The current study is less concerned with identifying the perpetrator of maltreatment and is instead focused on the experience of child maltreatment from any caregiver in the participant's history. As such, in the current study we eliminated the need for two additional responses per item by consolidating the responses. That is, rather than rating each item for mother, father, and an older adolescent, wording was changed to "Please rate the frequency with which the behaviors were directed toward you by a primary caregiver…"

Brief Resilience Scale

The Brief Resilience Scale (BRS) is a 6-item self-report questionnaire developed by Smith and colleagues (2008). The BRS focuses on qualities of resilience as a direct measure of resilience. Participants are asked to rate the extent of which they agree to each item on a five-point Likert scale where (1) = strongly disagree, (2) = disagree, (3) = neutral, (4) = agree, and (5) = strongly agree. The BRS consists of three positively worded and three negatively worded items (Smith et. al., 2008). To obtain a score negatively worded items are reverse coded, then all responses are summed and divided by 6 (the number of items) to obtain an overall mean score.

The original study tested factor structure, reliability and validity. Smith and colleagues (2008) found internal consistency using Cronbach's alpha which ranged from .80 to .91 between four samples. The results across four samples supported one factor. The authors established test-retest reliability of .69 (at one month) and .62 (at three months) by having two of the samples take the BRS a second time. The original study also showed good convergent validity of BRS with several related constructs assessed through zero-order correlations. BRS was positively correlated with optimism, life purpose, active coping, and positive affect. BRS was negatively correlated with pessimism, self-blame, denial, stress, and depression (Smith et al., 2008).

Food Recall

The food recall form used in the current study was inspired by the USDA's Healthy Eating Index (HEI; Krebs-Smith et al., 2018). The HEI has 13 components, each represents the recommendations presented in the dietary guidelines for Americans. Each component (set of scores) has a maximum score. The component scores are summed to the maximum score of 100 (Krebs-Smith et al. 2018). The scores received are based on an individual's recommended intake. Recommended intake amounts are based on caloric intake, meaning someone with a higher caloric intake should have a greater number of servings of a food group than someone with a lower caloric intake (Krebs-Smith et al., 2018).

Though the HEI is a commonly used measure to assess nutritional status, the complete HEI is beyond the scope of the current study. The currently described review of the literature examined positive outcomes associated to fruits and vegetables; therefore, the measure for this study will solely look at fruit and vegetable intake.

Participants are asked two questions regarding how many cups of fruit and how many cups of vegetables they have had in the last day. In order to standardize responses, multiple choice format was employed. This multiple-choice format represented the recommended daily intakes for all caloric ranges put forth by the USDA (USDA, 2020). Examples from myplate.gov are provided to give participants an idea of what constitutes a cup.

Attentional Checks

As an added level of control, there are questions between the measures to ascertain attentiveness of the participants. The questions are common knowledge questions with clear correct or incorrect responses and are multiple choice format. An example question is as follows: What month comes immediately after April? Responses include March, December, May, and July. Data from participants that answer the attentional checks incorrectly were not used in the final analysis.

Demographics

The final portion of the survey consisted of the demographic questions. The demographic questions were placed at the end of the survey to prevent potential priming of participants. Participants were asked to respond to a series of demographics questions related to gender, age, and ethnic background. Questions were in multiple choice format. Participants were asked what gender they identify as (i.e., male, female, other, non-binary, not listed, or I prefer not to respond. Next, participants were prompted to report their age within a range (i.e., ranges 18-21, 22-25, 26 and older, or I prefer not to respond). Then participants were asked to provide their ethnic background and include the following responses: Black/African American, White/Caucasian, Hispanic, Asian, not

listed, and I prefer not to respond. The final demographic question prompted participants to report what type of degree they were obtaining.

Procedure

Participants were asked to take part in an online survey. They were first presented with an "Information and Disclosure Section," followed by a consent form, and informed consent had to be obtained to continue. The participants were informed of the purpose of the study as well as a description of what the study entails. If the participant met eligibility requirements, wished to participate, and consented to participate, participants could begin the survey. This study used a portion of what was collected from the larger project. The three separate measures reviewed above are combined into a single Qualtrics survey. At completion of the survey, participants were debriefed. Debriefing is a highly important part of psychological research where participants are informed of the hypotheses being tested and provided with tools or resources available related to the survey content. Due to the sensitive nature of the content of the survey, resources were provided at the end of the survey for any participant wishing to obtain additional support. Participants were thanked for their participation in the study.

Results

Prior to analysis, the data was cleaned. Participants with excessive missing data were removed as were participants who incorrectly responded to attentional checks. During the process of cleaning the data, it was discovered that critical data had not been included for one of the measures (CCMS). CCMS scores are summed to get a total score. With this consideration in mind, analyses were conducted with the understanding that maltreatment is likely underestimated. It is understood that findings from this study are

not comparative to other research utilizing the CCMS, and that results from this study may not accurately depict the relationship between the variables of interest.

Analyses for this study were conducted using SPSS software (version 26). An alpha level of .05 was utilized to determine significance. First, descriptive statistics were run (means, standard deviations, and skewness to determine normality). Descriptive statistics for all variables of interest can be found in Table 2. The CCMS total and the nutrition total were positively skewed outside acceptable limits. CCMS and nutrition scores were plotted by way of boxplot to investigate for potential outliers. No outliers were found for nutrition scores, but there was determined to be one outlier among CCMS scores. That score was removed from the data set. After removing the outlier, descriptive statistics were conducted a second time for CCMS scores, but skewness remained outside acceptable limits. Square-root transformations were conducted for CCMS and nutrition scores, and descriptive statistics were conducted again using the new root variables. The square-root transformations successfully corrected the issue bringing both variables' skewness within acceptable limits. The descriptive statistics of the square-root transformations for CCMS and nutrition scores are included in Tables 3 and 4.

Table II

Descriptive Statistics for Variables of Interest

	n	Min. Statistic	Max. Statistic	M	SD	Skewness Statistic	Skewness Std. Error
Dependent Variable							
Nutrition Total	92	5.00	15.00	7.82	2.30	1.01	0.25
BRS	95	1.00	5.00	3.10	0.92	-0.07	0.25
CCMS	92	12.00	81.00	24.63	11.50	1.98	0.25
Valid N (listwise)	90						

Note. BRS = Brief Resilience Scale. CCMS = Comprehensive Child Maltreatment Scale.

Table III

Descriptive Statistics of the Root Transformations for Nutrition Scores

	n	Min. Statistic	Max. Statistic	M	SD	Skewness Statistic	Skewness Std. Error
Root Nutrition	92	2.24	3.87	2.77	0.40	0.62	.25
Valid N (listwise)	92						

Table IV

Descriptive Statistics of the Root Transformations for CCMS Scores

	n	Min. Statistic	Max. Statistic	M	SD	Skewness Statistic	Skewness Std. Error
Root CCMS	91	3.46	7.48	4.81	0.95	0.78	.25
Valid N (listwise)	91						

Next, bivariate correlations were conducted. Results can be found in Table 5. No significant relationship was found between nutrition and resilience, $r = -.04$, $n = 92$, $p =$

.70. This study also set out to examine a possible moderating effect of CCMS scores on the relationship between resiliency and nutrition. To explore this, a moderated multiple regression was conducted. The main predictors (CCMS and nutrition) were centered, and an interaction term was created by multiplying the centered nutrition scores by the centered CCMS scores. A linear model was tested where resiliency was predicted from the centered CCMS scores, centered nutrition scores, and the interaction term. Results are included in Table 6. The overall regression was not statistically significant; $R^2 = .05$, $F(3, 85) = 1.39$, $p = .25$. It was found that BRS scores did not significantly predict centered CCMS scores ($\beta = -0.10$, $p = 0.39$), centered nutrition scores ($\beta = -0.02$, $p = 0.82$), or the interaction variable ($\beta = -0.17$, $p = 0.14$).

Table V
Results from Bivariate Correlations

	Pearson r		
	1	2	3
1. CCMS ($n = 91$)	-		
2. Nutrition ($n = 92$)	0.06	-	
3. BRS ($n = 95$)	-0.14	-0.04	-

Note: *p < .05, **p < .01. The variables had different *n* values, which is noted after each variable in the table.

Table 6
Multiple Regression Predicting Resilience

Predictor	Zero-order r	B	p
CCMS	-.14	-.10	.39
Cent. Nutrition	-.06	-.02	.82
Cent. CCMSxCent Nutrtion	-.19	-.17	.14

Note. $R^2 = .05$. Predictors represented are centered values. Exact *p* values are for the unique effects of the predictors. Bolded values represent significance.

Discussion

Participants reported average intakes of fruits and vegetables ($M = 2.77$), which is a bit higher than expected. Due to their nutritionally poor environments, it would be expected to see low intakes of fruits and vegetables among college students (Wattick et al., 2018). This may suggest an overall change in dietary habits among college students which consists of more nutritious foods than seen previously. Another possible explanation is nutritionally rich foods are more affordable and available to college students than in previous years. Lastly, it could be a flaw in the design of the questionnaire (see below).

Participants showed slightly higher than average resilience ($M = 3.10$). The minimum root CCMS scores was 3.46, meaning all the participants included in analysis reported some level of maltreatment highlighting the vast prevalence of childhood maltreatment as demonstrated in the Child Maltreatment Reports of 2019 and 2020 (U.S. Department of Health & Human Services, 2021, U.S. Department of Health & Human Services, 2022). The data showed a negative relationship (though not significant) between CCMS scores and level of resilience. This finding is in line with previous research such as Hammen and colleagues (2000) stress-sensitization theory, which states that early life stressors contributed to a lower threshold for stress in the future.

This study examined the relationship between positive nutrition (i.e., greater amounts of fruit and vegetable intake) and resilience among college students. It was hypothesized that positive nutrition and resilience would be positively correlated. This correlational study did not find a significant relationship between positive nutrition and resilience. Moreover, there was a negative relationship between nutrition and resilience,

which was not in line with previous research. According to one study, nutrition may foster resilience when used in conjunction with other intervention methods, meaning a positive, though not significant, relationship should be demonstrated by the data (Yousafzai et al., 2013). This was not found in the current study, rather an inverse relationship was demonstrated. This may be due to variations in methodology between studies. The conflicting findings from this study compared to others add to the ambiguity found in the literature.

A secondary hypothesis was that child maltreatment severity (as a function of frequency) would have a meditating effect, thereby weakening the association between positive nutrition and resilience. A linear model demonstrated childhood maltreatment did not have a mediating effect on the relationship between positive nutrition and resilience. An interesting relationship exists between CCMS and positive nutrition. According to the research discussed throughout this study, maltreatment and poor nutrition are associated with negative physical and mental health outcomes, suggesting a logical hypothesis that these two variables should be positively correlated. In the case of this this study (looking at positive rather than negative nutrition), it stands to reason CCMS and positive nutrition would demonstrate a negative relationship. Though not significant, CCMS and positive nutrition were positively related in this study. Participants with higher maltreatment histories also reported higher intakes of fruits and vegetables. This finding is likely due to an error in design (see below).

There are limitations in this study that may have contributed to the null findings. Critical data was left off the CCMS scale, meaning maltreatment is likely underestimated thereby affecting the overall findings. The sample size was approximately 90 college

students. A larger sample size may be able to produce more significant results. In addition to sample size, the population was limited to college students who were highly homogenous demographically. Results found in this study may be limited to that population regarding age, education level, the developmental stage they are in, and even their current environment. For example, college students' dietary intake is subject to what is available and affordable. A sample that includes a broader demographic may produce more significant results, as well as be more representative of the nation's adult population. This study employed the use of self-report data which is limited and subject to their biases. In particular, the data from the nutritional survey used in the current study may be confounded by the participant's ability to accurately recall what they ate in the last day.

Future research should employ a larger, more diverse sample size. One possible direction this research could take is utilizing a more precise measure of nutrition. For example, the use of technology or apps like My Fitness Pal would give greater nutritional insight. This app asks people to track what they ate, then it provides a breakdown of nutritional facts. It breaks daily intake down into macronutrients as well as key vitamins and minerals. Use of this measure in similar research could give insight into the relationship between resilience and specific vitamins and/or minerals. It can also track over longer periods of time to provide a more accurate picture of a participant's general nutrition. An app such as this in conjunction with reminders to track at varied time intervals would provide greater insight and more data to work with, as well as narrow down the specific nutrients associated with resilience furthering the direction of the research.

In conclusion, though this study produced no significant findings, it is likely due to the limitations of the design. A more controlled study is needed to draw definitive conclusions. I believe there is merit a correcting the design flaws of this study and conducting a similar study. The benefits outweigh the costs considering the potential positive impact it could have on at-risk individuals' mental and physical outcomes.

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Appendix A

The Comprehensive Child Maltreatment Scale

Before the age of 13, how frequently did you experience any of the following behaviors?
Please rate the frequency with which the behaviors were directed toward you by a
primary caregiver (e.g. mother, father, foster parent, step-parent, a relative, family friend)
using the following response scale:.

0= never or almost never; 1= occasionally; 2= sometimes; 3= frequently; 4= very
frequently

1.   Physically punished for wrongdoing (e.g., smacking, grabbing, shaking):

                          0   1   2   3   4

2.   Other use of violence (e.g., hitting, punching, kicking):

                          0   1   2   3   4

3.   Severely hurt you (requiring medical attention):

                          0   1   2   3   4

4.   Before the age of 13, how frequently did you witnessed any of these behaviors
listed above (1-3) directed towards others in the family?

                          0   1   2   3   4

Before the age of 13, how frequently did you experience any of the following behaviors?
Please rate the frequency with which the behaviors were directed toward you by a
primary caregiver (e.g. mother, father, foster parent, step-parent, a relative, family friend)
using the following response scale:

0= never or almost never; 1= occasionally; 2= sometimes; 3= frequently; 4= very

frequently

5.   Yelled at you:

0   1   2   3   4

6.   Ridiculed, embarrassed, used sarcasm (made you feel guilty, silly, or ashamed):

0   1   2   3   4

7.   Provoked, made you afraid, used cruelty:

0   1   2   3   4

8.   How frequently do you believe you witnessed any of the behaviors listed above

(5-7) directed towards others in the family?

0   1   2   3   4

Before the age of 13, how frequently did you experience any of the following behaviors?

Please rate the frequency with which the behaviors were directed toward you by a

primary caregiver (e.g. mother, father, foster parent, step-parent, a relative, family friend)

using the following response scale:

0= never or almost never; 1= occasionally; 2= sometimes; 3= frequently; 4= very

frequently

9.   Not given you regular meals or baths, clean clothes, or needed medical attention:

0   1   2   3   4

10.   Shut you in a room alone for an extended period of time:

0   1   2   3   4

11.   Ignored your requests for attention; did not speak you for an extended period of time:

$$0 \quad 1 \quad 2 \quad 3 \quad 4$$

Before you turned 13, did an older person (i.e. an adolescent that was at least 5 years older than you or an adult 18 years of age or older) engage in any of the following types of sexual activity with you? Please rate the frequency of each type of sexual activity listed below that was directed toward you a primary caregiver (e.g. mother, father, older adolescent, foster parent, step-parent, a relative, family friend) using the following response scale:

0= never; 1= once; 2= twice; 3= 3-6 times; 4= 7-20 times; 5= more than 20 times

12.   Requested you to do something sexual:

$$0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5$$

13.   Forced you to watch others having sex:

$$0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5$$

14.   Showed you his erect penis:

$$0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5$$

15.   Touched your penis, vagina, or breasts:

$$0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5$$

16.   Made you touch his penis/her vagina or breasts:

$$0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5$$

17.   Put his/her mouth on your penis or vagina:

0   1   2   3   4   5

18.   Made you put your mouth on his penis/her vagina:

0   1   2   3   4   5

19.   Put his penis in your vagina or anus:

0   1   2   3   4   5

20.   Put a finger in your vagina or anus:

0   1   2   3   4   5

21.   Put other object in your vagina or anus:

0   1   2   3   4   5

22.   Made you put your penis inside a vagina or anus:

0   1   2   3   4   5

Appendix B

Food Recall

1.   In the last day about how many cups of fruits have you had? (Please include fresh, frozen, caned, and dried fruits as well as 100% fruit juices. Please exclude fried fruits. As a rule of thumb one medium sized fruit, half of a large fruit, ½ cup of dried fruit is considered one cup equivalent.)

a.	Fewer than 1.5		d.	2.5
b.	1.5		e.	More than 2.5
c.	2		f.	Unsure

2.   In the last day about how many cups of vegetables have you had? (Please include fresh, frozen, and canned vegetables cooked or raw as well as 100% vegetable juice. Please exclude fried foods. As a rule of thumb one large vegetable or 2 cups of leafy vegetables is considered a cup equivalent.)

a.	Fewer than 1.5		d.	4
b.	1.5 – 2.5		e.	Greater than 4
c.	3 – 3.5		f.	Unsure

Appendix C

Attentional Checks

1.   What month comes immediately after April?

      a.   March   c.   May

      b.   December   d.   July

2.   What does $1 + 1$ equal?

      a.   1   c.   3

      b.   2   d.   4

3.   What does $2 + 2$ equal?

      a.   3   c.   5

      b.   4   d.   8

4.   What article of clothing is traditionally worn on the foot?

      a.   Shoe   c.   Hat

      b.   Jacket   d.   Gloves

Appendix D

Demographic Questions

1.   How would you describe your gender?

    a.   Male   d.   Not Listed

    b.   Female   e.   I prefer not to respond

    c.   Non-binary

2.   What is your age?

    a.   18-22   c.   26 and older

    b.   22-25   d.   I prefer not to respond

3.   What is your ethnic background?

    a.   Black / African American   d.   Asian

    b.   White / Caucasian   e.   Not Listed

    c.   Hispanic   f.   I prefer not to respond

4.   What degree are you obtaining?

    a.   Trade/technical/vocational   c.   Bachelor's Degree

        training   d.   Master's or Doctoral Degree

    b.   Associate's Degree   e.   Other

Appendix E

IRB
INSTITUTIONAL REVIEW BOARD
Office of Research Compliance,
010A Sam Ingram Building,
2269 Middle Tennessee Blvd
Murfreesboro, TN 37129
FWA: 00005331/IRB Regn. 0003571

MIDDLE TENNESSEE
STATE UNIVERSITY

IRBN001 - EXPEDITED PROTOCOL APPROVAL NOTICE

Thursday, May 19, 2022

Protocol Title	*Risk and Resilience: Mental Health Functioning in Individuals with Histories of Adverse Childhood Experience*
Protocol ID	22-2136 7q
Principal Investigator	**Ciera Schoonover** (Faculty)
Co-Investigators	Karrie Hubbard (klh2bf), Amanda Wilson (akw4h), and Madelyne Williams (mnw6s)
Investigator Email(s)	ciera.schoonover@mtsu.edu
Department	Psychology
Funding	NONE

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU IRB through the **EXPEDITED** mechanism under 45 CFR 46.110 and 21 CFR 56.110 within the category *(7) Research on individual or group characteristics or behavior.* A summary of the IRB action is tabulated below:

IRB Action	APPROVED for ONE YEAR		
Date of Expiration	4/30/2023	Date of Approval: 4/21/22	Recent Amendment: 5/19/22
Sample Size	FIVE HUNDRED (500)		
Participant Pool	Target Population: Primary Classification: **General Adults (18 or older)** Specific Classification: **College/University Sutdents (MTSU SONA)**		
Type of Interaction	☐ Non-interventional or Data Analysis ☒ Virtual/Remote/Online Interaction ☐ In person or physical Interaction – Mandatory COVID-19 Management		
Exceptions	1. Contact information and simple demographics are permitted. 2. Retention of participant information to comply with SONA policy is approved.		
Restrictions	**1. Mandatory ACTIVE Informed Consent.** **2. Other than exceptions listed above, identifiable data/artifacts, such as, audio/video data, photographs, handwriting samples, personal address, driving records, social security number, and etc., MUST NOT be collected. Recorded identifiable information must be deidentified as described in the protocol.** **3. Mandatory Final report (refer last page).** **4. Not Approved for in-person data collection**		
Approved Templates	IRB Templates: Recruitment Script (SONA) and Online Informed Consent Non-MTSU Templates: Web Posting and Social Media script		
Research Inducement	SONA Credit (2)		
Comments	NONE		

Post-approval Requirements

The PI must read and abide by the post-approval conditions (Refer "*Quick Links*" in the bottom):

- *Reporting Adverse Events:* The PI must report research-related adversities suffered by the participants, deviations from the protocol, misconduct, and etc., within 48 hours from when they were discovered.
- *Final Report:* The PI must close-out this protocol by submitting a final report before 4/30/2023 (Refer to the Continuing Review section below); REMINDERS WILLNOT BE SENT. Failure to close-out or request for a continuing review may result in penalties including cancellation of the data collected using this protocol and/or withholding student diploma.
- *Protocol Amendments:* An IRB approval must be obtained for all types of amendments, such as: addition/removal of subject population or investigating team; sample size increases; changes to the research sites (appropriate permission letter(s) may be needed); alterations to funding; and etc.   The proposed amendments must be clearly described in an addendum request form. The proposed changes must be consistent with the approval category and they must comply with expedited review requirements.
- *Research Participant Compensation:* Compensation for research participation must be awarded as proposed in Chapter 6 of the Expedited protocol. The documentation of the monetary compensation must Appendix J and MUST NOT include protocol details when reporting to the MTSU Business Office.
- *COVID-19:* Regardless whether this study poses a threat to the participants or not, refer to the COVID-19 Management section for important information for the PI

Continuing Review   (Follow the Schedule Below)

This protocol can be continued for up to THREE years by requesting a continuing review before 4/30/2023.   Refer to the following schedule to plan your annual progress report; REMINDERS WILL NOT BE SENT.   Failure to obtain an approval for continuation will result in cancellation of this protocol.

Reporting Period	Requisition Deadline	IRB Comments
First year report	3/31/2023	NOT COMPLETED
Second year report	3/31/2024	NOT COMPLETED
Final report	3/31/2025	NOT COMPLETED

Post-approval Protocol Amendments:

The current MTSU IRB policies allow the investigators to implement minor and significant amendments that would fit within this approval category. *Only TWO procedural amendments will be entertained per year* (changes like addition/removal of research personnel are not restricted by this rule).

Date	Amendment(s)	IRB Comments
05/19/2022	Additional participant sample consistent with the approval is added. Recruitment script and online informed consent are added to reflect the amendment.	IRBA2022-366

Other Post-approval Actions:

The following actions are done subsequent to the approval of this protocol on request by the PI or on recommendation by the IRB or by both.

Date	IRB Action(s)	IRB Comments
NONE	NONE	NONE

COVID-19 Management:

The PI must follow social distancing guidelines and other practices to avoid viral exposure to the participants and other workers when physical contact with the subjects is made during the study.

- The study must be stopped if a participant or an investigator should test positive for COVID-19 within 14 days of the research interaction. This must be reported to the IRB as an "adverse event."
- The MTSU's "Return-to-work" questionnaire found in Pipeline must be filled by the investigators on the day of the research interaction prior to physical contact.
- PPE must be worn if the participant would be within 6 feet from the each other or with an investigator.
- Physical surfaces that will come in contact with the participants must be sanitized between use
- **PI's Responsibility:** The PI is given the administrative authority to make emergency changes to protect the wellbeing of the participants and student researchers during the COVID-19 pandemic. However, the PI must notify the IRB after such changes have been made. The IRB will audit the changes at a later date and the PI will be instructed to carryout remedial measures if needed.

Data Management & Storage:

All research-related records (signed consent forms, investigator training and etc.) must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data must be stored for at least three (3) years after the study is closed. Additional Tennessee State data retention requirement may apply (*refer "Quick Links" for MTSU policy 129 below*). The data may be destroyed in a manner that maintains confidentiality and anonymity of the research subjects.

The MTSU IRB reserves the right to modify/update the approval criteria or change/cancel the terms listed in this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

Quick Links:
- Post-approval Responsibilities: http://www.mtsu.edu/irb/FAQ/PostApprovalResponsibilities.php
- Expedited Procedures: https://mtsu.edu/irb/ExpeditedProcedures.php
- MTSU Policy 129: Records retention & Disposal: https://www.mtsu.edu/policies/general/129.php

Appendix F

IRBF024 - INFORMED CONSENT for ONLINE STUDIES
(Use this consent template when recruiting adult participants when online data are collected)

General Information
1. Use this form for requesting online consent for enrolling participants in your study that involves no more than minimal risk
2. The participants must be 18 years or older AND they must NOT be classified as "vulnerable" or considered as special populations by OHRP or other federal/state laws.
    a. Minors under the age of 18, women who are pregnant and prisoners are classified as vulnerable in addition to certain individuals whose cognitive ability to give consent is reduced due to any medical, physical, financial or other situations.
3. This template is suitable for studies that qualify for exemption as well as those which are reviewed by the expedited or full review mechanisms.
4. Alterations and waiver of this template are strongly discouraged.
5. Mandatory Consent Requirements for online use:
    a. Use the same text used in this form when requesting online consent from the participants – Provide the online consent link for IRB review
    b. The first page of the survey must display this informed consent text.
    c. Participants' consent to participate must be entertained by two distinct responses: one to consent and one to decline.
        i. The participant age must be verified through a separate question
        ii. Agreeing to consent and age verification must both be true before the online instrument can be administered.
        iii. Additional questions may be asked for filtering ineligible participants
6. The Faculty Advisor information will be removed at the review/approval stage if the PI is NOT a student.

Instructions
1. Sections of this form that may be irrelevant to your study, such as compensation, alternative methods offered and etc can be removed by clicking appropriate boxes.
2. The boxes listed in the bottom of the consent form are for the participants
3. Barring the actual signatures, the text boxes in two sections must be properly completed before submitting for IRB approval.
4. All irrelevant information to the protocol will be removed at the approval stage.

IRBF024 – Participant Informed Consent (ONLINE)
Language to be used for online surveys that qualify for "no more than minimal risk"

Use the following text as printed here in the first page of the Qualtrics survey to administer online informed consent. Alterations to this template are allowed on a case by case basis. However, making alterations would delay the review and approval process.

<u>Information and Disclosure Section</u>

The following information is provided to inform you about the research project in which you have been invited to participate. Please read this disclosure and feel free to ask any questions. The investigators must answer all of your questions and please save this page as a PDF for future reference.

- Your participation in this research study is voluntary.
- You are also free to withdraw from this study at any time without loss of any benefits.

For additional information on your rights as a participant in this study, please contact the Middle Tennessee State University (MTSU) Office of Compliance (Tel 615-494-8918 or send your emails to irb_information@mtsu.edu. (URL: http://www.mtsu.edu/irb).

Please read the following and respond to the consent questions in the bottom if you wish to enroll in this study.

1. **Purpose**: This research project is designed to help us evaluate various factors that potentially influence mental health concerns, (e.g., depressive symptoms) in college students.
   .
2. **Description**: If you agree to participate after reading this informed consent form, there are several parts to this project. They are:
   o A brief demographic survey that will collect information about your gender, age, and ethnicity.
   o A survey that will ask you about child maltreatment situations you may have experienced during childhood, including abuse (e.g., sexual, physical, psychological).
   o A survey that will ask you questions about stress that you may have experienced in the past month.
   o A survey that will ask you questions about how you might have felt or behaved in the last week.
   o A survey that will ask you questions about resilience factors.
   o A brief survey asking you to report your current nutritional habits (e.g., fruit and vegetable consumption).
3.
4. **IRB Approval Details**
   o Protocol Title: Risk and Resilience: Mental Health Functioning in Individuals with Histories of Adverse Childhood Experiences
   o Primary Investigator: Ciera Schoonover
   o PI Department & College: Psychology - MTSU
   o Faculty Advisor (if PI is a student): N/A
   o Protocol ID: 22-2136 7q   Approval Date: 4/21/2022   Expiration Date: 4/01/2023

5. **Duration**: The whole activity should take more than 30 minutes.

6. **Here are your rights as a participant:**

   - Your participation in this research is voluntary.

- You may skip any item that you don't want to answer, and you may stop the experiment at any time (but see the note below)
- If you leave an item blank by either not clicking or entering a response, you may be warned that you missed one, just in case it was an accident. But you can continue the study without entering a response if you didn't want to answer any questions.
- Some items may require a response to accurately present the survey.

7. **Risks & Discomforts:** For participants who may have a history of negative experiences during childhood, participation in this study may elicit emotional responses. The likelihood and extent of the discomfort, however, is not higher than could be expected during a routine psychological examination. Available resources will be provided at the end of the study for those who wish to speak with a professional. MTSU will not provide compensation in the case of study related injury.

8. **Benefits:**
   a. Benefits to you that you may not receive outside this research: There are no direct benefits to you.
   b. Benefits to the field of science or the community: Benefits to the field of science or the community: Although there is no direct benefit to the participant, there is social and scientific value to exploring factors that may be related to determining relationships among risk and resilience factors following adverse childhood experiences in college students.

9. **Identifiable Information**: You will NOT be asked to provide identifiable personal information, such as your name or IP address.

10. **Compensation:** There will be NO compensation for completing this survey.

11. **Confidentiality.** All efforts, within reason, will be made to keep your personal information private but total privacy cannot be promised. Your information may be shared with MTSU or the government, such as the Middle Tennessee State University Institutional Review Board, Federal Government Office for Human Research Protections, *if* you or someone else is in danger or if we are required to do so by law.

12. **Contact Information.**   If you should have any questions about this research study or possibly injury, please feel free to contact Dr. Ciera Schoonover by telephone (615 898 2584) or by email ciera.schoonover@mtsu.edu OR my faculty advisor, N/A. You can also contact the MTSU Office of compliance via telephone (615 494 8918) or by email (compliance@mtsu.edu). This contact information will be presented again at the end of the experiment.

You are not required to do anything further if you decide not to enroll in this study. Just quit your browser. Please complete the response section below if you wish to learn more or you wish to part take in this study.

Participant Response Section

☐No ☐Yes I have read this informed consent document pertaining to the above identified research

☐No ☐Yes The research procedures to be conducted are clear to me

☐No ☐Yes I confirm I am 18 years or older
☐No ☐Yes I am aware of the potential risks of the study

By clicking below, I affirm that I freely and voluntarily choose to participate in this study.   I understand I can withdraw from this study at any time without facing any consequences.

☐ NO I do not consent
☐ Yes I consent