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Long Term Effects Analysis of Children Exposed to Postpartum Depression

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LONG TERM EFFECTS ANALYSIS OF CHILDREN EXPOSED TO POSTPARTUM DEPRESSION

by

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A thesis submitted in partial fulfillment of the requirements
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Thesis Chair: W. Steven Saunders

ABSTRACT

The purpose of this study is to explore and understand any correlation between a mother having postpartum depression and her now college-level child having a mental illness. The research question posed for this study was: Is there a correlation between maternal postpartum depression and the development of mental illnesses in college students? Studies have shown that there is a correlation in early childhood development, but there are deficits when it comes to long-term follow-up. Data for this study was collected via online surveys on SONA UCF. The results from the Chi-square test imply a strong association ($p = .007$) at $n=85$. Since many college students presently suffer from an array of mental illnesses, it is crucial to trace it back to the roots of the problem.

DEDICATION

To my family and friends that who to my endless spew of ideas. To my younger self who had a dream and went for it.

ACKNOWLEDGMENTS

I want to thank Professor Saunders and Dr. Fry for making this project possible because, without them, this thesis would still be an unfulfilled dream in my head.
I also want to thank the University of Central Florida for having the Honors Undergraduate Thesis Program so that I could have such a memorable research opportunity.
Lastly, I want to give the hugest thanks to Ms. Duhaney for helping me with the statistical analysis. You were doing your job, but for me, you were truly a blessing sent from above.

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CHAPTER 1: INTRODUCTION

PPD is a major depressive disorder that affects about 10-15% of child-bearing women annually in the US (Guintivano et al., 2019). The symptoms of PPD usually arise within a month after delivery and can persist for up to a year (Ay et al., 2019). Even so, it is still a challenge to pinpoint the exact cause of the complication (Guintivano et al., 2019). However, there have been a few studies that have been able to identify some correlations, yet none have made it out of clinical trials (Guintivano et al., 2019). Factors that have been studied so far include genetics, epigenetics, neuroactive molecules, psychiatric history, adverse life events, perinatal risk factors, obstetrical outcomes, and demographic information (Guintivano et al., 2019). There have been studies that stated that PPD has a 50% chance of being inherited (Guintivano et al., 2019). Prenatal psychiatric history of mental disorders remains the most predictive factor for PPD thus far (Guintivano et al., 2019). The causes of these can vary based on the abuse on the mother, whether it be sexual, physical, or psychological (Guintivano et al., 2019). The disorder has a wide array of causes stemming from maternal childhood maltreatment (Choi et al., 2019) to having a complicated pregnancy/ birth, a difficult relationship with the father of the child, lack of familial support, lack of confidence, and the inability to breastfeed (Werner et al., 2015). The use of antidepressant drugs, as well as a combination of social support, psychoeducation, cognitive-behavioral therapy, and exercise may be effective in reducing the risk of developing postpartum depression (Werner et al., 2015). They also followed up with the women post-pregnancy and found a few successes in the intervention, which shows promise, barring future studies (Werner et al., 2015). The stress that the body gets placed under because of these increases the risk of a mother having PPD (Guintivano et al., 2019). Studies have shown that a low socioeconomic

status can be a risk factor for PPD (Guintivano et al., 2019). More studies need to be done to understand the causes of PPD, but steps are being taken in the right direction (Guintivano et al., 2019).

It all starts with the mother's mental health and whether she had problems before the pregnancy or not (Rajyaguru et al., 2021). Studies show that a rise in psychiatric disorders during pregnancy was related to a decrease in maternal mental health (Roberson et al., 2016). Therefore, extra precautions must be taken into consideration not harm the child if the mother is taking medication (Roberson et al., 2016). It may seem like an easy fix to change the medication or dosage to make it safer, but a problem may arise if the dosage is too small since it could trigger the mother, leading to self-harm or harming the baby (Roberson et al., 2016). Similarly, the mother may stop taking her medication in an attempt not put the baby at risk, which sadly is only putting the mother at further risk for a relapse (Roberson et al., 2016). However, not all mothers who have had depression before continue to have abusive behavior toward their children unless bonding difficulties arise (Choi et al., 2010). On the other hand, mothers who have no prior history of depression but develop postpartum depression feel overwhelmed, which leads to low physical health in the child (Abdollahi et al., 2017). The effect of maternal depression may subside over time, but the effects that it may have on the child may become long term due to exposure alone (Abdollahi et al., 2017).

The disorder can impair the relationship between the mother and the child (Madigan et al., 2015). The child of depressed mothers may suffer from uncertain affection, meaning the mother may distance themselves from their child, causing long-term effects on the child's growth development (Abdollahi et al., 2017). Mothers with PPD are usually poor role models for their children since they lack confidence in their maternal abilities (Abdollahi et al., 2017). They will

feel incapable of giving proper care and may refuse even to try because the mothers may perceive their child negatively, leading to abuse and negligence (Abdollahi et al., 2017). Therefore, mothers who have experienced depression often continue to show difficulties in familial relationships even when recovered since they tend to become contentious and incommunicative (Murray, 1992). The mother's age at birth can impact the child's social skills development (Mirhosseini et al., 2015). Older mothers positively impact the child's cognitive development, while younger mothers significantly impact on the child's language development (Mirhosseini et al., 2015). A younger mother will be more interactive with their child than an older mother with two or more children, but it could also be an effect of their depression (Mirhosseini et al., 2015). This means that since the mother has possibly had to deal with depression after each child, the negative externalizing behavior will become more severe, though the internalizing behavior will decrease (Letourneau et al., 2019). Overtime, these small actions and lack of interaction can strain the connection between mother and child (Kasamatsu et al., 2020).

The child's gender can affect the level of care and affection shown to the child (Grace et al., 2003). Depressed mothers tend to treat boys more negatively than girls just because of how they communicate with them (Mirhosseini et al., 2015). The speech of the depressed mother is less infant-focused toward the male since they seem to feel that the boys need less compassion than the females, which they tend to coddle (Mirhosseini et al., 2015). This leads to the boys having a higher risk of losing an essential bond with their mothers as they tend to pay more attention to their female children than their male children (Mirhosseini et al., 2015). The girls are deemed fragile; therefore, they need more affection in their infant stage to grow and manage social issues better (Grace et al., 2003; Mirhosseini et al., 2015). On the other hand, boys must

fend for themselves and learn how to adapt to their surroundings leaving them to develop insecurities (Grace et al., 2003; Mirhosseini et al., 2015). Similarly, both genders will exhibit behavioral problems, but they deal with them differently (Agnafors et al., 2013; Gao et al., 2007). The girls will internalize their problems through inhibition and withdrawal, while boys will externalize their problems through hyperactivity and aggression (Gao et al., 2007; Letourneau et al., 2019). These expressions of emotion are similar to the behavior of a toddler throwing a tantrum but will amplify as they become adolescents (Agnafors et al., 2013; Gao et al., 2007). In addition, another cause for boys to receive more negative treatment than girls may be the effect of an imbalance within the relationship of their parents (Murray, 1992). The reasoning for the differential treatment of the children's sexes is still unclear (Murray, 1992). The effects of the disorder can affect both genders negatively, but the boys seem to have a more significant impact than the girls (Mirhosseini et al., 2015).

Women with postpartum depression tend to raise socially isolated (Murray & Cooper, 1997). The bonding between a mother and a child in the first few minutes is the most important in the child's life cognitive and psychomotor development (Abdollahi et al., 2017). This is when the child uses interaction to learn how to communicate (Abdollahi et al., 2017). At 18 months, infants who have incommunicative mothers show a lower infant performance, such as reaching adequate milestones, than infants whose mothers did not have PPD (Murray,1992). Despite this, the children will not shy away from their mothers, instead, they become insecurely attached to them (Beck, 1998; Murray, 1992). Furthermore, the timing of the diagnosis plays a significant role in the outcome of the problems the child may develop (Agnafors et al., 2013). The child may find it easier to adjust to maternal depression if exposed to it over a period, leading to decreased social competence and increased behavioral problems (Agnafors et al., 2013). Though this may

be the case for some, in general, any exposure to maternal depression in the child causes some behavioral disability (Agnafors et al., 2013).

The hormones of highest interest are corticotrophin-releasing hormone (CRH), oxytocin, serotonin, and thyroid hormone (Grieb & Lonstein, 2022; Guintivano et al., 2019). The hormone used to assess the risk of PPD is allopregnanolone, which is a GABA-A receptor with positive allosteric modulator properties (Guintivano et al., 2019; Meltzer-Brody & Kanes, 2020; Osborne et al., 2017). Allopregnanolone and progesterone follow the same route throughout the pregnancy (Meltzer-Brody & Kanes, 2020; Osborne et al., 2017) The abrupt decline of allopregnanolone in the womb postpartum could play a significant role in the development of PPD (Meltzer-Brody & Kanes, 2020; Osborne et al., 2017). There have also been studies on salivary cortisol, but results are still inconclusive since both low and elevated levels have been shown to have positive indicators that lead to PPD (Guintivano et al., 2019; Iliadis et al., 2015). Oxytocin is known for its role in maternal care towards their offspring (Grieb & Lonstein, 2022; Guintivano et al., 2019). A study on postpartum rodents showed that the mesolimbic dopamine (DA) system via the ventral tegmental area (VTA), more specifically, the oxytocin-dopamine interaction, plays a crucial role in motivated maternal behavior (Grieb & Lonstein, 2022). This includes pup-licking, pup retrieval, and nest building, essential interactions for the young rodent offspring (Grieb & Lonstein, 2022). This is an effect of the increase of DA in the nucleus accumbens (NAc) (Grieb & Lonstein, 2022). A similar effect is seen in connection with the medial preoptic area (mPOA), which works by shutting off the receptors for fear and anxiety of the rodent dams towards their young (Grieb & Lonstein, 2022). The oxytocin-serotonin interaction regulates postpartum anxiety, depression, and aggression (Grieb & Lonstein, 2022**).** Serotonin metabolism in the dorsal raphe tends to be higher in postpartum females than in virgins (Grieb & Lonstein, 2022).

If a serotonin antagonist is administered to the rodents via an injection, the maternal behaviors decrease while administering an agonist blocks the reaction from occurring (Grieb & Lonstein, 2022). Given the information presented above, hormone regulation seems to play a significant role in the way that mothers tend to their children's needs; therefore, human women with PPD may have a challenging time taking care of their young.

Early maternal behavior can permanently alter the development of the hypothalamic-pituitary-adrenal (HPA) axis, which can affect rodent pups (Weaver et al., 2004; Liu et al., 1997). Studies show that rat pups that had a high licking and grooming and arched-back nursing (LG-ABN) grew into adults that were able to regulate their fear and anxiety responses much when compared to pups that had low LG-ABN mothers (Hellstrom et al., 2012.; Weaver et al., 2004). A similar effect occurs in a decrease of CRH postpartum, a hormone produced by the placenta (Guintivano et al., 2019; Weaver et al., 2004). The release of CRH can be blocked by an increase in sensitivity to glucocorticoid negative feedback via glucocorticoid receptors (GR), which in turn reduces the stress response in rodents (Meaney, 2001; Meaney & Szyf, 2005; Weaver et al., 2004). A high release or abrupt drop in CRH in rodents has shown positive signs of being an indicator of PPD, which would cause the offspring to have a higher reaction to stress during adulthood (Guintivano et al., 2019; Weaver et al., 2004). Maternal separation in animals also shows a decrease in GR resulting in adult animals having fearful reactions to new environments (Hellstrom et al., 2012; Meaney, 2001). The effects of maternal neglect on an offspring can be reversed through tactile stimulation (Hellstrom et al., 2012; Liu et al., 2005). This effect is similar to cross-fostering, where pups of low LG-ABN mothers get fostered by high LG-ABN mothers within the first week of birth and vice versa (Liu et al., 1997; Meaney, 2001; Meaney & Szyf, 2005; Weaver et al., 2004). In the end, there were no significant differences between the

pups who were initially born to low LG-LGN mothers and then fostered by high LG-LGN and pups born to high LG-ABN mothers and were not fostered (Liu et al., 1997; Meaney, 2001; Meaney & Szyf, 2005; Weaver et al., 2004). These results show that the epigenome of the rodents had been altered based on maternal behavior (Meaney & Szyf, 2005; Weaver et al., 2004). Based on the information stated before, a human child born of a mentally absent mother could still have normal stress regulations if they were to have another caretaker in replacement of their mother.

Given the information presented in the literature review above there is a correlation between children having early developmental problems as a result of their mothers having PPD. The purpose of this study is to identify that college students whose mothers had postpartum depression (PPD) are at a higher risk for mental illness. Studies have shown that there is some correlation in early childhood development, but there are deficits when it comes to long-term follow-up. Mental illness awareness has become more prevalent over the years. Since many college students presently suffer from an array of mental illnesses, it is crucial to trace it back to the roots of the problem.

CHAPTER 2: METHODOLOGY

Participants

Participants were recruited online via SONA, a UCF Psychology Research Participation System. The participants had to be at least 18 years old to participate in the study and to complete Survey 2, and they must have first completed Survey 1. Participation in this study was voluntary, and no consequences were given for not completing it. Upon completion of each survey, participants were granted 0.25 credit. A total of 85 students completed Survey 1 with ages ranging from 18 to 42 (*M*=21.11 *SD*=4.03). Only 21 (24.7%) participants completed the Survey 2 with ages ranging from 18-27 (*M*=20.19 *SD*=2.99). The frequency of females (76.2%) and males (23.8%) was similar to that of Survey 1. See **Table 1** for complete demographic information.

Table 1 - Demographic information for participants (n=85)

		n	%
Age Range	18-21	45	52.9
	22-24	30	35.3
	25-28	7	8.2
	Over 28	3	3.5
College Grade Level	Freshman	19	22.4
	Sophomore	12	14.1
	Junior	22	25.9
	Senior	27	31.8
	Other	5	5.9
Race/Ethnicity	Caucasian	41	48.2
	Black/African American	10	11.8
	Asian/ Pacific Islander	7	8.2
	Hispanic/Latino	16	18.8
	Other	11	12.9
Gender	Female	66	77.6
	Male	19	22.4

Data Collection

The questions used for the surveys were all created specifically for this study since a study of this caliber has never been done on college students. Based on information from the literature review, this type of study, if done on humans, was usually in a longitudinal form that went from birth to adolescence. There have also been experiments on rodents with results coming from biological testing. Therefore, there were no available psychological tests that approximated that aligned with the question this study aimed to answer. Survey 1 (10 Qs) consisted of multiple-choice questions regarding demographics, binary (Y/N), and free-response questions to assess eligibility. Survey 2 consisted of scalar, binary (Y/N) and free response questions to assess the current mental health and childhood trauma of the participant. Survey 2 was uploaded a week after the initial posting of Survey 1.

Tables

Table 2 - Survey 1

	Question	Response Type	Response
1	Age	Free Response	
2	What is your college grade level?	Multiple choice	Freshman; Sophomore; Junior; Senior; Senior plus (5th year or more undergraduate); Graduate
3	Race/ Ethnicity	Multiple choice	African American/Black; Asian/ Pacific Islander; Caucasian; Hispanic/ Latino; Native American; Other; Prefer not to answer
4	What is your current gender identity?	Multiple choice	Woman; Man, Trans-Woman, Trans-Man; Non-Binary; Other; Prefer not to say
5	To your knowledge, did your mother have postpartum depression?	Yes/No	
6	If yes to the previous question, was she diagnosed by a professional, or was it just suspected?	Diagnosed/Suspected/Not Applicable	
7	To your knowledge, did your mother have any mental illnesses before giving birth to her first child?	Yes/No	
8	If yes to the previous question, how old were you?	Free Response	
9	Were you ever diagnosed with any mental illnesses?	Yes/No	
10	If yes to the previous question, how old were you?	Free Response	

Table 3 - Survey 2

	Question	Response Type	Response
8	To your knowledge, did your mother suffer from any mental illness prior to your birth?	Yes/No/Not applicable	
9	To your knowledge, did your caregiver (someone other than your biological mother) have a mental illness?	Yes/No/Not applicable	
10	Family size at the time of birth (mother, father, caregiver, friends, any siblings in the home)	Free Response	
11	Current family size (mother, father, caregiver, any siblings in the home, spouse)	Free Response	
12	Age of mother at birth	Free Response/Not applicable	
13	Current age of mother	Free Response/Not applicable	
14	Current age of caregiver, if not biological mother	Free Response/Not applicable	
19	Have you ever had to seek professional help for your mental illness (therapy, medication, etc.)?	Free Response/Not applicable	
20	Describe the relationship between you and your mother.	Free Response/Not applicable	
21	How close are you with your mother?	Likert Scale [a]	1-7; NA
22	How close are you with your caregiver?	Likert Scale [a]	1-7; NA
23	Did you suffer any form of neglect from your mother (mistreatment, abandonment, inattention)?	Yes/No/Not applicable	
24	If yes to the previous question, what would you rank the level of neglect?	Likert Scale [a]	1-7; NA
25	Were you labeled a problem child (got punished often, parents/guardian got called to school, etc.)?	Yes/No	
26	In the last year, what would you rank your mental health?	Likert Scale [a]	1-7; NA
27	In the last year, did you have to seek professional help for your mental health (therapist/ psychiatrist)?	Yes/No	
28	In the last year, have you taken any medication because of your mental health?	Yes/No	
29	In the last year, have you resorted to overconsuming alcohol because of your mental health/	Yes/No	
30	As a child, did you have a learning disability?	Yes/No	
31	If yes to the previous question, what kind?	Free Response/Not applicable	
32	At this present moment, what would you rank your mental health?	Likert Scale [a]	1-7; NA

Note. The missing questions were omitted from the table since they were similar to demographic questions from Survey 1. [a] 1: Least; 7: Most.

Data Analysis

To analyze the data, several different methods were used to determine the correlation between PPD and mental illnesses in college students. The significance of the relationship between the maternal PPD (PPD Diagnosed, PPD Suspected and No PPD) and the child developing a mental illness was assessed using a Pearson Chi-Square Test on the initial sample (n=85). One-Sample T-Test was used to determine the significance between childhood trauma and the current mental health of the participant. The significance level that will be used is 0.05. A One-Way ANOVA test was done to assess the overall significance of maternal PPD affecting childhood years compared to college years. A scoring scale was used to assess mental health based on the binary questions (Yes= 1; No= 0), while the Likert scale response questions ranging from 1-7 (ranges were reversed to make the parameters the same as the binary answers) were used at face value to get a sum which indicated a mental health score. The Childhood Trauma Scale included questions 20, 24, 25 and 30. The Current Mental Health Scale included questions 19, 27, 28 and 32.

CHAPTER 3: RESULTS

The initial sample (Table 1) showed the demographical characteristics of the participants, which showed that the highest age range was 18 to 21 (52.9%), while the smallest range was students over 28 (3.5%). Most students were Seniors (31.8%), followed by Seniors (25.9%). The majority were Caucasian (48.2%) and female (77.6%). When those who did not complete Survey 2 were excluded (n=21), the variables for the highest age range (75.2%), gender (76.2%), and race (42.9% remained constant. In contrast, most participants were Freshmen (38.1%).

Table 4 – Cross- Tabulation

		Mental Illness Diagnosis				Total	
		Yes		No			
		N	%	N	%	N	%
Mother Type	Yes Diagnosed	5	13.2%	3	6.4%	8	9.4%
	Yes Suspected	11	28.9%	3	6.4%	14	16.5%
	No	22	57.9%	41	87.2%	63	74.1%
Total		38	100.0%	47	100.0%	85	100.0%

Mothers were grouped into three categories (Table 4): Diagnosed PPD (9.4%), Suspected PPD (16.5%) and No PPD (74.1%). The students were grouped into two categories: Mental Illness (44.7) and No Mental Illness (55.3%). There was a significant relationship between maternal PPD and the development of a mental illness in the child, X^2 (2, N= 85) = 9.96, p= .007. After adjusting for the 75% loss due to follow-up there was no longer significance between the two variables, X^2 (2, N= 21) = 1.817, p= .403.

Table 5 - Chi-Square Test (Mother PPD vs. Student Mental Illness Diagnosis)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.960[a]	2	.007
Likelihood Ratio	10.231	2	. 006
Linear-by-Linear Association	6.501	1	.011
N of Valid Cases	85		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 3.58.

Based on the One-Way ANOVA test done with childhood trauma due to at least one of the three types of PPD categories, there is significance in the data, F (2,18) = 4.41, p = .028. In contrast, to the test done with current mental health diagnosis of the student, there is no significance between the groups, F (2,18) = 1.35, p = .29. The scoring scale values that were summed up from Survey 2 were used as the dependent value, and the mother type was the independent value.

Table 6 - One-Way ANOVA Test of Between-Subject Effects (Dependent variable: Childhood Trauma)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	35.690[a]	2	17.845	4.407	.028
Intercept	201.146	1	201.146	49.679	<.001
Mother Type	35.690	2	17.845	4.407	.028
Error	72.881	18	4.049		
Total	316.000	21			
Corrected Total	108.571	20			

a. R Squared = .329 (Adjusted R Squared = .254)

Table 7 - One-Way ANOVA Test of Between-Subject Effects (Dependent variable: Current Mental Health)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7.179[a]	2	3.589	1.347	.285
Intercept	205.763	1	205.763	77.219	<.001
Mother Type	7.179	2	3.589	1.34	.285
Error	47.984	18	2.665		
Total	323.000	21			
Corrected Total	55.143	20			

a. R Squared = .130 (Adjusted R Squared = .034)

The last type of analysis was a one-sample t-test to assess the known mean against a test mean/value. Usually, this value would come from previous standardized data, but since there was no access to such data due to the nascency of this study topic. The value zero denote a normal person in the population that has not been affected by childhood trauma or current mental health problems. In this study, there is a significant difference between students who have childhood trauma (M= 3.14, SD= 2.33) when compared to students in general, t (20) = 6.18, $p < .001$. In this study, there is also a significant difference between students who have a mental illness (M= 3.57, SD= 1.66) when compared to students in general, t (20) = 9.86, $p < .001$.

Table 8 - One-Sample *t*-Test Results

	Test Value = 0						
	t	df	Significance		Mean Difference	95% Confidence Interval of the Difference	
			One-Sided p	Two-Sided p		Lower	Upper
Childhood Trauma	6.181	20	<.001	<.001	3.14286	2.0823	4.2034
Current Mental Health	9.856	20	<.001	<.001	3.57143	2.8156	4.3273

CHAPTER 4: DISCUSSION

The purpose of this study was to determine if there was any correlation between maternal PPD and mental illness in college students and what factors may contribute to this relationship. There were three key findings from this research.

The results from the Chi-square test strongly imply that there is an association ($p = .007$) at n=85, but at n=21, the power of the data weakens, and therefore the results show no association ($p= .29$). These results are consistent with the claim that states that there are long term effects from maternal PPD (Abdohalli et al., 2017). Even though it was significant in a previous study by Mirhosseini et al., 2015, the mother's ages at birth yielded insignificant results and were therefore omitted. The questions from Survey 1 were only used for the correlational and demographic analysis to show significance and to make quantitative comparisons. Since Survey 1 was initially supposed to be a preliminary survey to assess eligibility, the data was only used to assess correlation significance.

The questions in Survey 2 were organized into two categories to distinguish between childhood factors and current factors in the students' lives. These questions were not taken from any previous studies directly since a study such as this one has not been done before. It was interesting to see that there was a significance with childhood trauma ($p = .028$) while current mental health had no significance ($p = .28$) when compared to whether their mother had PPD or not. This seems to be purely from the small sample size since the Chi-square test of these variables showed significant association when n=85). The results due to childhood trauma are consistent with previous studies (Madigan et al., 2015; Abdohalli et al., 2015; Kasamatsu et al.,

2020; Gao et al., 2007; Agnafors et al., 2013). They cover all the parameters that were analyzed in scalar values. These include childhood neglect, relationship with their mother, learning disabilities, and behavioral problems. One interpretation of this could be that the effects of maternal PPD are stronger at a younger age. However, since we must reject the null hypothesis for the p-value from the current mental health data, we cannot conclude that its effects dwindle with time. As studies previously were usually done with children, the questions chosen for current mental health was chosen with the average college/university student's social life in mind. The questions chosen were asking about seeking professional, alcohol abuse and medication as well as assessing their current level of mental stability using a Likert scale.

The results from the *t*-Test were also taken from the data collected in Survey 2. A person with childhood trauma is significantly different ($p > .001$) when compared to the general population. This claim is supported by previous literature stating that neglected children (childhood trauma parameter) were affected more negatively when compared to children with no maternal PPD (general population) (Abdollahi et al., 2017). Similarly, a person who develops a mental illness is significantly different ($p > .001$) when compared to the general population. As previously stated in the literature review, the children of mothers with PPD tend to show some sign of mental illness development when compared to children whose mothers had no PPD (Agnafors et al., 2013). Taken together, our findings imply that there is a strong correlation between maternal PPD and mental health issues seen in college-level students.

Certain limitation that could be addressed in future research as this topic becomes more widely recognized are as follows. The most significant would be the 75% of participants lost to follow-up. The survey design can also be adjusted to get clearer results. Future studies should consider sticking to one type, such as a binary questionnaire or scalar questions (Likert scale).

This adjustment would make analysis more efficient since free-response questions are more challenging to quantify. The last survey adjustment would be to use one survey instead of two to account for the loss of the participants. The "current mental health" stability questions could use some adjustments. The questions chosen were based on my current knowledge of how college age students usually deal with their problems. Therefore, there may have been some factors that were overlooked. Time constraints also played a significant role in the completion of the project. Another limitation of the surveys was that the answer choice types differed, which could have affected how the participants answered the questions. For example, all questions should be binary or scalar, not both.

Despite these limitations, this research is significant because it is a novel study that can pave the way for future studies. The information in this study could hopefully answer some of the puzzling questions that surface regarding the prevalence of mental health issues that are observed in the young adults of our society. Understanding the root of the issue could help to lower the excessive use of psychiatric drugs.

CHAPTER 5: CONCLUSION

The results collected in this study support the claim that there is a correlation between maternal PPD and college-level students having mental illnesses. This study is essential since it could lead researchers closer to understanding another aspect of PPD that has not been looked at before. This study focuses more on the children than the mother's perspective, which is uncommon in most PPD studies. Another aspect of this study not commonly focused on is the use of college students instead of infants and toddlers. This study is introductory so many variables could be evaluated to understand this topic further.

APPENDIX
IRB APPROVAL

UNIVERSITY OF CENTRAL FLORIDA

Institutional Review Board
FWA00000351
IRB00001138, IRB00012110
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

EXEMPTION DETERMINATION

September 11, 2023

Dear W. Steven Saunders:

On 9/11/2023, the IRB determined the following submission to be human subjects research that is exempt from regulation:

Type of Review:	Initial Study
Title:	Long Term Effects Analysis of Children Exposed to Postpartum Depression
Investigator:	W. Steven Saunders
IRB ID:	STUDY00005828
Funding:	None
Documents Reviewed:	• (9_8)IRB Saunders 5828 HRP-255 - FORM - Request for Exemption 9.8.23.docx, Category: IRB Protocol; • IRB Saunders 5828 HRP-254 - FORM - Explanation of Research .pdf, Category: Consent Form; • Survey Questions 1 (update).docx, Category: Survey / Questionnaire; • Survey Questions 2 (Update).docx, Category: Survey / Questionnaire;

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made, and there are questions about whether these changes affect the exempt status of the human research, please submit a modification request to the IRB. Guidance on submitting Modifications and Administrative Check-in is detailed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system. When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Kamille C. Birkbeck

Kamille Birkbeck
Designated Reviewer

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