Investigating the Relationship Between Childhood Depressive Symptoms and Prosocial Behavior with Guilt and Anhedonia as Moderating Factors

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Abstract

Prosocial behavior is defined as any voluntary social behavior performed to benefit others. While many studies have found that prosocial behavior protects against depressive symptoms and negative emotions, few have examined what variables may moderate the relationship between depressive symptoms and prosocial behavior. Guilt and anhedonia, two symptoms common in depressive disorders, may be especially relevant to prosocial behaviors, with guilt possibly leading to greater prosocial behaviors and anhedonia leading to less prosocial behaviors. However, the moderating effects of guilt and anhedonia have not yet been tested. The purpose of the current study is to investigate the relationship between childhood depressive symptoms and prosocial behavior, while examining guilt and anhedonia as moderating factors. We hypothesize that that greater levels of anhedonia will be associated with less prosocial behavior and greater symptoms of guilt will predict greater prosocial behavior in the relationship between depression and prosocial behavior. Using the Adolescent Brain Cognitive Development (ABCD) Study dataset of over 11,000 children, we analyzed these factors and found that anhedonia moderates the relationship between depression and prosocial behavior while guilt does not. Specifically, lower levels of anhedonia showed a more pronounced decline in prosociality as depression increased. These results have major implications for recognizing and treating childhood depressive symptomatology and disorders.

Investigating the Relationship Between Childhood Depressive Symptoms and Prosocial Behavior with Guilt and Anhedonia as Moderating Factors

Major Depressive Disorder (MDD) among youth has been steadily increasing for decades. In 2007, 8% of U.S. teens between the ages of 12 and 17 reported experiencing at least one major depressive episode in the past year. Ten years later, in 2017, this number increased to 13% of 12- to 17-year-olds in the U.S. (Geiger & Davis, 2020). In 2020, this number rose to 17% – a 30% increase in just three years (U.S. Department of Health and Human Services). While depressive symptoms increase exponentially in adolescence, these symptoms are also found in pre-adolescence (Bailey et al., 2007). Depressive symptoms in youth have many detrimental effects. Not only is pediatric MDD severely impairing during each episode, but it can also lead to future complications such as additional mood disorders, substance use disorders, suicidal attempts, and educational and employment issues (Fergusson & Woodward, 2002). In order to recognize and reduce these problems, we need to better understand how depressive symptoms manifest in youth.

To be diagnosed with MDD based on the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5), individuals must either experience a depressed mood nearly every day (this can also manifest as irritability in children) or experience a notable loss of interest or pleasure, also known as anhedonia (American Psychiatric Association, 2013). Individuals must also experience four or more of the following symptoms: changes in weight/appetite, insomnia/hypersomnia, psychomotor changes, fatigue, feelings of guilt and/or worthlessness, inability to think or concentrate as well as before, and thoughts of death/suicide (American Psychiatric Association, 2013).

While not an explicit symptom of MDD, there has been growing interest in examining the relationship between prosocial behaviors and MDD. Prosocial behavior is defined as voluntary social behavior executed to benefit others, including altruistic and reciprocal behavior (Bar-Tal, 1976). Based on the DSM's symptoms of MDD, there could be two possible relationships between prosocial behavior and MDD. Anhedonia, or the loss of interest or pleasure, may result in individuals with MDD losing interest in social/peer relationships or lacking the experience of pleasure that is often an outcome of prosociality, ultimately resulting in less prosocial behavior. On the other hand, the increased levels of guilt that accompany MDD may result in depressed youth feeling bad for their peers and, in turn, engaging in more prosocial behavior. Based on these competing theories which predict effects in opposite directions, it is essential that we work to better understand the relationship between pediatric MDD and prosociality.

The purpose of the current paper is to provide a review of the literature on the relationship between prosocial behaviors and depressive symptoms and to present the results of a study examining prosocial behaviors in youth with MDD symptoms. This review will first focus on research examining whether prosociality protects against depressive symptoms. Then the mixed findings from studies examining how depressive symptoms are related to prosociality will be reviewed. This paper will suggest that these mixed findings are due to prior studies not accounting for the relative amount of guilt or anhedonia present in patients with depressive disorders. Therefore, this review will also examine how guilt and anhedonia are related to prosocial behaviors. Finally, this paper will address the gaps in the literature by presenting new empirical research testing guilt and anhedonia as moderators of the relationship between

depressive symptoms and prosocial behaviors in a large sample of over 11,000 children from the Adolescent Brain Cognitive Development (ABCD) Study.

Prosociality as a Protective Factor

Numerous studies have found that prosocial behavior and helping others have positive effects on mental health (Alden & Trew, 2013; Chen et al., 2002; Mason et al., 2019; Tashjian et al., 2021). Specifically, prosociality is correlated with increased self-worth (Nelson et al., 2015) and self-esteem (Evans & Smokowski, 2015). Prosociality is also associated with a decrease in depressive symptoms and negative psychological outcomes (Singh et al., 2015), an improvement in optimism during adversity (Douglas et al., 2019), and an increase in prevention strategies, coping mechanisms, and strength (Macartney et al., 2014; Moore et al., 2019). However, two studies found that high levels of altruism (a concept closely related to prosociality) can actually increase the occurrence of MDD (Ahmer, 2009; Fujiwara, 2007). Therefore, there is contrasting evidence about whether prosocial behavior increases or protects against depressive symptoms. Overall, however, most studies find that prosociality serves as a protective factor against many mental health and related issues, which suggests that it is important to further understand the relationship between prosocial behaviors and depressive symptoms.

Depressive Symptoms Predicting Prosocial Behaviors

The literature relating depressive symptoms to prosociality has produced contradictory results. Some studies found that depressive symptoms and/or negative mood leads to increased altruism/prosociality (Cáceda et al., 2014; Harlé et al., 2010; Li & Ferraro, 2005; McClure et al., 2007; Neugebauer et al., 2020; Thompson et al., 1980). For example, Neugebauer et al. (2020) examined a sample of individuals with a mean age of 42 and found that MDD was significantly

positively associated with altruism. However, altruism was measured through self-report data and was therefore vulnerable to bias (Neugebauer et al., 2020).

Other studies find the opposite relationship between depressive symptoms and prosociality. For example, several studies have found that depressive symptoms can decrease prosocial behavior (Surbey et al., 2011; Thompson et al., 1980; Moore et al., 1973; Underwood et al., 1977). Surbey et al. (2011), in particular, examined 80 undergraduate students in Australia and found that individuals with depressive symptoms expressed less cooperation (Surbey et al., 2011). However, this study was limited by its lack of racial, gender, and socioeconomic diversity. It is also unclear whether cooperation is the same as prosociality. It should also be noted that these studies had relatively small sample sizes. But overall, we have a number of studies that contradict the findings of prior work.

In contrast to the studies that either find a positive association (more depressive symptoms, more prosociality) or a negative association (more depressive symptoms, less prosociality), some studies do not find significant effects. At least three studies found that depressive symptoms or negative mood had no significant effect on prosociality (Lampropoulou, 2016; Morris & Kanfer, 1983; Rosenhan et al., 1974). Specifically, Lampropoulou (2016) found in a sample of 299 participants with a mean age of 18.1 years that there was no association between depressive affect and prosocial behavior, as measured by self-report questionnaires. Thus, adding to the ambivalence, we have studies that do not support either a positive or negative association between depressive symptoms and prosocial behavior.

Theories Regarding Discrepant Findings Between Depressive Symptoms and Prosociality

Two possible reasons have been proposed for the discrepancy in findings in studies relating depressive symptoms to prosocial behaviors. The first explanation is that the relationship

between depressive symptoms and prosociality depends on how the depressive symptoms originate. Thompson et al. (1980) explained that this contradiction is a result of the varying types of negative moods that exist. Those whose negative mood results from others' problems tend to exhibit prosociality, while those whose negative mood arises from their own problems engage in less altruism (Thompson et al., 1980). This theory was supported by Gibbons and Wicklund (1982) who suggested that self-concern/preoccupation, which is sometimes associated with depressive symptoms (Shinji, 1999), can hinder prosociality. Thus, the contradictory findings in the literature on depressive symptoms and prosociality may be due to the relative amount of preoccupation present in MDD patients.

The second possibility is that the discrepancy in findings is due to different relationships between depressive symptoms and prosociality in males and females. While women tend to engage in more prosocial behaviors than men, one study found that depressed men exhibited greater levels of prosociality than healthy men while depressed women exhibited lower levels of prosociality than healthy women (Cáceda et al., 2014). Other research has examined this relationship using hormone levels. Oxytocin, an important hormone that females usually have higher levels of than males, was found to be positively correlated with both depressive symptoms and prosocial behavior (Crespi, 2015). In contrast, testosterone, the primary male sex hormone, was negatively correlated with prosociality and depressive symptoms (Crespi, 2015). Of note, these findings are in the opposite direction of those reported in Cáceda et al. (2014), which may suggest that sex differences do not fully explain these discrepant findings.

The current project will add a third possibility for these discrepant findings: that the relationship between depressive symptoms and prosocial behaviors depends on how much anhedonia and/or guilt is present. As noted previously, anhedonia and guilt are common

symptoms of depressive disorders. Anhedonia may predispose some individuals with depressive symptoms to be less motivated to engage in prosocial behavior. Unlike the preoccupation theory proposed by Thompson et al. (1980), here we suggest that the lack of prosocial behavior in this case is due to social withdrawal and loss of interest in others, not preoccupation with one's own problems. Additionally, prosociality can also be motivated by a variety of positive and negative emotions including empathy and guilt (Roberts et al., 2014). Those with depressive symptoms who report high levels of guilt may be predisposed to feel strong negative emotions for perceived wrongdoings. Such empathic responses may be associated with wanting to help others in need, which would lead to greater prosocial behaviors. Thus, the mixed findings in the literature may be due to whether depressed individuals show greater levels of anhedonia or guilt. This theory may also explain the discrepant findings between males and females if each has a tendency towards greater anhedonia or guilt symptoms. Few studies have examined how the relationship between depressive symptoms and prosociality may depend on levels of these symptoms. The following sections will review the literature that supports this theory.

Association Between Guilt and Prosociality

Countless studies have found guilt to be one of the most influential motivators of prosociality (Scaffidi Abbate et al., 2022; Vaish et al., 2016; Roos et al., 2014; Estrada-Hollenbeck & Heatherton, 1998). This could be explained by the close relationship between empathy and both guilt and prosociality (Estrada-Hollenbeck & Heatherton, 1998). When an individual feels guilty, they tend to empathize and sympathize with the victim (Caprara et al., 2001). As a result, they may feel a need to undo or compensate for their transgression by apologizing and seeking forgiveness. They may also work to make amends with the person they hurt (Lindsay-Hartz, 1984). These are all examples of prosocial actions. The current literature

suggests that individuals participate in these prosocial behaviors to repair relationships and alleviate feelings of guilt (Estrada-Hollenbeck & Heatherton, 1998).

Additionally, some studies have found a relationship between religious-based guilt and prosocial behavior (McKay et al., 2012; Quiles & Bybee, 2010). Specifically, McKay et al. (2012) found that Catholics who remembered committing and confessing to a past sin were more likely to donate money to the church. This suggests that those who felt guilt for a sin were more likely to act prosocially in the form of donation.

Although most of the studies on guilt and prosociality focus on adolescents and adults, guilt-motivated prosociality can be seen in children as young as 3 years old (Vaish et al., 2016). Vaish et al. (2016) found that 2-year-olds felt sympathy toward a harmed individual, but the guilt-specific effect arose in those that were 3 years old. The young children engaged in prosocial and reparation behaviors and expressed their guilt verbally when they caused harm to another individual (Vaish et al., 2016). Thus, it is important to examine the relationship between depressive symptoms, guilt, and prosocial behaviors in children as well.

Association Between Anhedonia and Prosociality

Few studies have focused on the specific relationship between anhedonia and prosocial behavior. One such study concluded that individuals with high levels of depressive symptoms, including social anhedonia, were less likely to engage in prosocial behaviors (Setterfield et al., 2016). However, this study was limited to only female participants. Other studies have demonstrated that people experience pleasure when helping others (Cialdini, 1991). This pleasure often motivates individuals to behave prosocially (Carlson et al., 1988). If anhedonia reduces an individual's ability to experience pleasure from prosocial behavior, they may be less motivated to execute this behavior.

Purpose of the Current Study

Overall, there are several studies related to depressive symptoms, prosociality, guilt and/or anhedonia. However, none to our knowledge have identified a specific relationship between these four factors. Additionally, the studies that have examined the effect of depressive symptoms on prosocial behavior have found mixed results. However, these studies did not directly account for anhedonia or guilt. Additionally, prior studies on these topics focused mainly on adults and adolescents and some only studied female participants. Furthermore, many of these studies relied on small sample sizes. Thus, it is important to study depressive symptoms, prosociality, guilt, and anhedonia simultaneously using a large sample of male and female children.

The present study aims to explain the contradictions in the literature by examining the associations between depressive symptoms, guilt, anhedonia, and prosocial behavior using a large sample of over 11,000 children from the Adolescent Brain Cognitive Development (ABCD) Study. Two specific hypotheses will be tested in relation to our research questions using moderation analyses. First, we predict that the relationship between depressive symptoms and prosociality will be moderated by the child's level of anhedonia such that greater levels of anhedonia will be associated with less prosocial behavior. Second, we hypothesize that the association between depressive symptoms and prosociality will depend on the child's level of guilt, with greater symptoms of guilt predicting greater prosocial behavior.

Methods

Participants

A total of 11,876 children were recruited for the 4.0 release of the Adolescent Brain Cognitive Development (ABCD) study at 21 different study sites around the United States. Table

1 shows the basic demographic information from the ABCD Study sample. At the beginning of the study in 2018, the participants were between the ages of 9 and 10. The mean age of participants was 9.91 years, with a standard deviation of 7.44 months. The participants will be followed for a decade with data being released annually. The baseline sample is 48.4% female and 51.6% male. Slightly over half of the cohort identified as Non-Hispanic White, while the remaining participants identified as Hispanic, African American, or belonging to other racial/ethnic categories. Additionally, more than half of the participants come from households with an annual income of $75,000 or higher, and a similar proportion had parents who held at least a bachelor's degree. In an attempt to increase the representativeness of the sample, the researchers worked with public, private, and charter schools. They received both parental consent and children's assent, and they compensated the families for their participation in the study. The data is de-identified and use of this dataset has been approved by the Institutional Review Board of Vanderbilt University.

Table 1

Demographics of participants in the ABCD Study sample (N=11,876)

	Mean	***SD***
Age (in years)	9.91	0.62
	N	***(%)***
Sex		
Female	5,682	47.8

Male	6,194	52.2
Race/Ethnicity		
Non-Hispanic White	6,180	52.0
Hispanic	2,411	20.3
African American	1,784	15.0
Other	1,499	12.62
Missing	2	0.02
Household Income		
<$5,000	417	3.51
$5,000 - $11,999	421	3.54
$12,000 - $15,999	273	2.30
$16,000 - $24,999	524	4.41
$25,000 - $34,999	654	5.51
$35,000 - $49,999	934	7.86
$50,000 - $74,999	1,499	12.6
$75,000 - $99,999	1,572	13.2
$100,000 - $199,999	3,314	27.9
$200,000	1,250	10.5

Missing	1,018	8.57
Parent Education		
No degree	604	5.09
High school / GED	1,442	12.14
Some College	1,949	16.41
Associate degree	1,538	12.95
Bachelor's degree	3,333	28.07
Master's degree	2,279	19.19
Professional / Doctoral	714	6.01
Missing	17	0.14

Note. The "Other" Race/Ethnicity category includes those who were identified by their parent as American Indian/Native American, Alaska Native, Native Hawaiian, Guamanian, Samoan, Other Pacific Islander, Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Other Asian, or Other Race. SD, Standard Deviation; GED, General Education Development degree

Materials

The CBCL (Child Behavior Checklist) was used to measure guilt, anhedonia, and depressive symptoms (Achenbach & Ruffle, 2000). This checklist is a 113-item rating scale that asks parents to describe their child's emotions and behaviors on a scale of 0 (*not true, as far as you know*) to 2 (*very true or often true*). Depressive symptoms were measured as the average of the following items that best approximate the symptoms of MDD in the DSM-5: "Unhappy, sad,

or depressed," "Cries a lot," "Stubborn, sullen, or irritable," "Doesn't eat well," "Overeating," "Sleeps less than most kids," "Sleeps more than most kids during day and/or night," "Trouble sleeping," "Can't sit still, restless, or hyperactive," "Underactive, slow moving, or lacks energy," "Overtired without good reason," "Feels worthless or inferior," "Can't concentrate, can't pay attention for long," "Inattentive or easily distracted," "Deliberately harms self or attempts suicide," and "Talks about killing self." The CBCL items related to guilt and anhedonia were kept separate so that we can test our hypotheses regarding the relationship between depressive symptoms, anhedonia, guilt, and prosociality. Guilt was measured with one item: "Feels too guilty" and anhedonia was measured as an average of three items: "There is very little they enjoy," "Would rather be alone than with others," and "Withdrawn, doesn't get involved with others."

Prosociality was measured using items from the Prosociality Behavior Scale of the Strength and Difficulties Questionnaire (SDQ) Caregiver Report (Goodman, 1997). The SDQ is a brief screening questionnaire of parent-rated behavioral symptoms in youth 2-17 years of age. Although the SDQ has multiple scales, the only scale relevant for the current study is the Prosocial Behavior Scale, which consists of five items. Of note, the ABCD Study only administered three items from this scale to reduce burden on participants. Caregivers were asked to rate their children on the following items using a scale of 0 (*not true*) to 2 (*certainty true*): "considerate of others' feelings," "helpful if someone is hurt," and "offers help to others" (Goodman, 1997). These three items were averaged together to create a prosociality variable for our analyses.

Design and Procedure

The ABCD Study used a longitudinal design; however, we only used the baseline time point in our analyses. Our measures of interest are quasi-independent variables (depressive symptoms, guilt, anhedonia, and biological sex). Participants that were missing data on our variables of interest were excluded from analyses. To test our hypotheses, we will use moderation analyses. Basic descriptive information of the sample and multiple linear regression analyses to test for moderation were conducted using R Studio. For the first hypothesis, the independent variables were guilt and depressive symptoms. The dependent variable was prosocial behavior. The interaction between depressive symptoms and guilt was examined to test whether a moderation relationship exists. For the second hypothesis, the independent variables were anhedonia and depressive symptoms, with prosociality being the dependent variable. The moderation interaction between depressive symptoms and anhedonia was tested.s

Results

Correlations between Depressive Symptoms and Prosocial Behavior

We first examined the relationship between depressive symptoms and prosocial behavior. Table 2 shows the descriptive statistics and correlation coefficients for the four main variables. Guilt was positively correlated with both anhedonia and depression scores, suggesting that higher guilt scores were associated with higher anhedonia scores and higher depression scores. Prosocial behavior scores were negatively correlated with both anhedonia and depression, suggesting that higher reported prosocial behavior was associated with lower reported anhedonia and depression. There was a significant positive correlation observed between anhedonia and depression scores, a finding consistent with the well-established association between anhedonia and depression, wherein anhedonia is one of the main reported symptoms of depression (American Psychiatric Association, 2013). There was no significant relationship between prosociality and guilt.

Table 2

Descriptive statistics and intercorrelations between main variables of interest

Variable	*M*	*SD*	1	2	3
1. Guilt	0.08	0.29			
2. Prosocial	1.75	0.40	-.10		
3. Anhedonia	0.14	0.27	.22**	-.19**	
4. Depression	0.19	0.21	.31**	-.22**	.49**

**$p < .01$

Relationship between Guilt/Anhedonia and Prosociality while Controlling for Depression

Next, we examined the relationships between guilt and prosociality, and anhedonia and prosociality while controlling for depression to see if the direction of the effects was consistent with our expectations even after removing the effects of other depressive symptoms. Controlling for depressive symptoms, guilt was positively associated with prosocial behavior suggesting that higher levels of guilt were predictive of higher reported prosocial behavior (Table 3). Controlling for depressive symptoms, anhedonia was negatively associated with prosocial behavior, indicating that higher levels of anhedonia were predictive of lower reported prosocial behavior (Table 4).

Table 3

Regression Statistics for Guilt

Effect	*β*	*SE*	*t*	p
Intercept	1.83	0.005	371.10	< 0.001
Depression	-0.45	0.02	-24.36	< 0.001
Guilt	0.09	0.01	6.68	< 0.001

Table 4

Regression Statistics for Anhedonia

Effect	*β*	*SE*	*t*	*p*
Intercept	1.83	0.005	371.87	< 0.001
Depression	-0.31	0.02	-15.56	< 0.001
Anhedonia	-0.16	0.02	-9.93	< 0.001

Moderating Effects of Guilt and Anhedonia

In order to test our hypotheses that guilt and anhedonia moderate the relationship between depression and prosocial behavior, a multiple linear regression analysis with guilt and anhedonia as moderators was performed, where the interaction between guilt or anhedonia and depressive symptoms was examined. Guilt did not significantly moderate the relationship between depressive symptoms and prosocial behavior ($p = .20$; Table 5). However, anhedonia did significantly moderate the relationship between depression and prosociality ($p < .001$; Table 6). Specifically, anhedonia moderates the relationship between depression and prosociality wherein lower levels of anhedonia are related to a slightly greater decline in prosocial behavior as depression increases (Figure 1).

Table 5

Moderation Statistics for Guilt

Effect	*β*	*SE*	*t*	*p*
Intercept	1.83	0.01	359.62	< 0.001
Depression	-0.45	0.02	-23.22	< 0.001
Guilt	0.07	0.02	3.03	0.002
Depression x Guilt	0.05	0.04	1.27	0.20

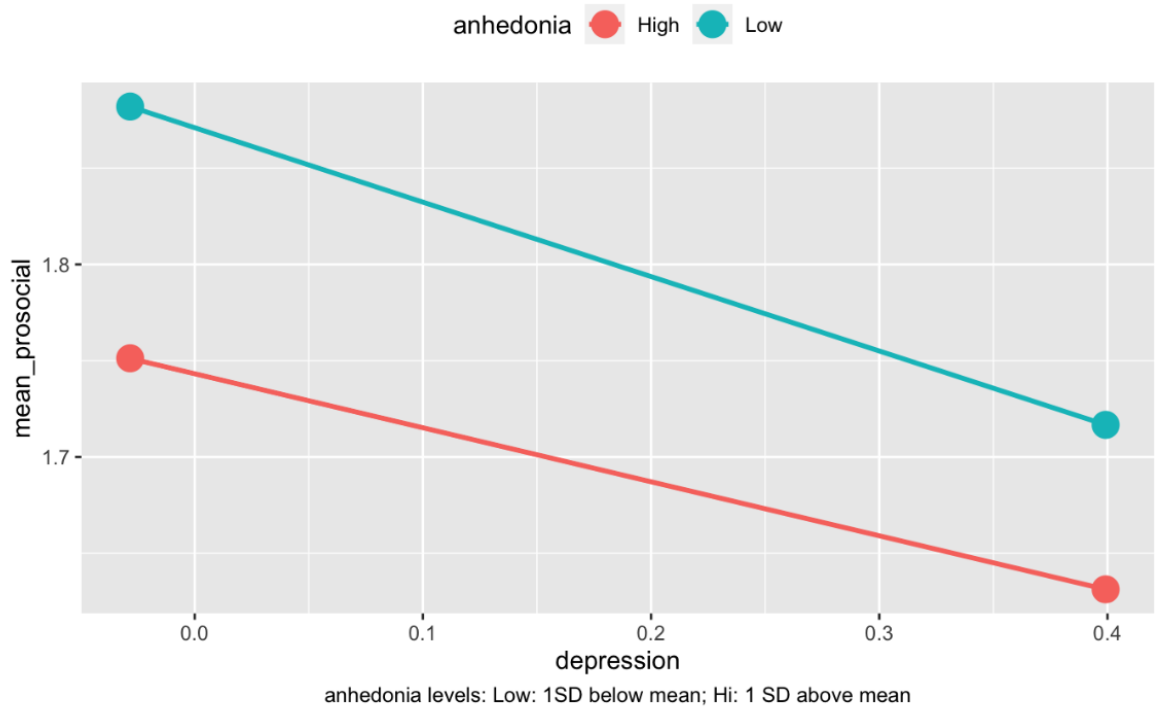
Table 6

Moderation Statistics for Anhedonia

Effect	*β*	*SE*	*t*	*p*
Intercept	1.84	0.01	343.32	< 0.001
Depression	-0.36	0.02	-15.77	< 0.001
Anhedonia	-0.24	0.02	-9.95	< 0.001
Depression x Anhedonia	0.19	0.04	4.48	< 0.001

Figure 1

Moderation Effect between Prosociality and Depression with Anhedonia



Discussion

The purpose of the present study was to investigate the relationship between depressive symptoms and prosocial behavior in children, with anhedonia and guilt as moderating factors. The results showed that as depression increases, prosocial behavior decreases. Additionally, after controlling for depressive symptoms, we found that guilt was associated with more prosocial behaviors while anhedonia was associated with fewer prosocial behaviors, consistent with the directions we predicted. While we hypothesized that both anhedonia and guilt would moderate the relationship between depressive symptoms and prosocial behavior, only anhedonia demonstrated a significant effect. Specifically, lower levels of anhedonia showed a greater decline in prosocial behavior as depression increased. This is the opposite of our hypothesis that greater levels of anhedonia will be associated with less prosocial behavior. However, this effect was subtle and could be explained by the low anhedonia participants having greater prosocial scores to begin with, allowing for more room for change.

Consistent with the literature reviewed, our findings revealed several important associations between depressive symptoms, guilt, anhedonia, and prosocial behavior. Our results clarified the contradictory findings regarding the relationship between depressive symptoms and prosocial behavior by supporting past findings that depression and prosocial behavior are negatively correlated (Surbey et al., 2011; Thompson et al., 1980; Underwood et al., 1977; Moore et al., 1973). Our results also align with the understanding of guilt and anhedonia as major characteristics of depression (American Psychiatric Association, 2013). Further, our findings support previous research demonstrating that anhedonia is negatively associated with prosocial behavior (Setterfield et al., 2016), indicating that people experiencing less pleasure from social interactions may be less inclined to engage in prosocial acts. Our results were also consistent with previous literature suggesting that guilt is positively associated with prosocial behavior (Scaffidi Abbate et al., 2022; Vaish et al., 2016; Roos et al., 2014; Estrada-Hollenbeck & Heatherton, 1998).

Importantly, our findings expand upon the existing literature by demonstrating that anhedonia moderates the relationship between depressive symptoms and prosocial behavior. This adds nuance to our understanding of how depressive symptoms may influence prosocial tendencies, suggesting that individuals with lower levels of anhedonia may exhibit a more pronounced decline in prosocial behavior as depressive symptoms increase. This further suggests that the relationship between depressive symptoms and prosocial behavior may vary depending on the level of anhedonia present, providing further insights into the interplay between depressive symptoms and prosocial tendencies. Overall, our study contributes to the discourse on the complex interplay between depressive symptoms, guilt, anhedonia, and prosocial behavior,

shedding light on potential mechanisms underlying these relationships in a large sample of children.

Limitations and Future Directions

There are several limitations of this study. First, our analyses tested for an association, not a causal relationship. Associations in cross-sectional data (at a single time point) cannot be used to infer causation. Future research could utilize the longitudinal data from the ABCD Study to understand whether depressive symptoms at baseline lead to prosocial behavior at a future time point.

Moreover, the CBCL is a parent-report measure. It is unclear whether parents are the most accurate reporters of internalizing symptoms in their children. Unlike externalizing behaviors, which are more noticeable, internalizing symptoms may be harder for parents to observe. Conversely, 9- to 10-year-olds may not be the best reporters of symptoms either. Because of their young age, they may lack insight into their own symptoms. In that case, parents may be better reporters. Future work could compare parent-report and self-report to see if one or the other is a better predictor of the associations found in the current study.

This study is also limited because the data were collected in a community-based sample, where anyone from the community can participate. The sample was not recruited specifically for having a depressive disorder, so the level of depressive symptoms in this sample may be lower (our effects may be smaller). But the large size of our sample means that we are well-powered to find even small effects. Future studies using clinical samples will be useful for determining whether stronger effects are present when there is adequate symptom severity.

Our age range is both a limitation and a strength. A narrow age range allows us to avoid combining diverse developmental periods together, which may obscure developmental effects.

However, we are unable to generalize our findings beyond 9- to 10-year-olds because of this narrow age range. Future work is needed that can replicate these findings in other age ranges.

Lastly, our measures were limited. For example, our measure of prosociality only has three items. While prior work has shown that this measure shows adequate internal consistency, these three items may not cover all aspects of prosocial behavior that might be important to these relationships. Likewise, we only had a small number of items to measure guilt and anhedonia. Future work should replicate these results using more comprehensive measures of prosociality, guilt, and anhedonia to uncover more nuanced relationships related to these constructs. Taken together, however, the present study further illuminates gaps in the literature that future research can seek to fill.

Conclusions

The present study fills a gap in the literature regarding the association between depressive symptoms and prosocial behavior. Our results support the hypothesis that there is a relationship between depression and prosociality, and that this relationship is moderated by anhedonia, but our hypothesis that guilt would also serve as a moderator was not supported. While our study was limited by its cross-sectional design and measurement strategies, our findings offer useful information about depressive symptoms. With rates of youth MDD on the rise over the past decade, the current study contributes important information for understanding how depressive symptoms manifest in youth and how these symptoms impact social behavior is critical to recognizing and working with depressed youth. Recognizing how guilt and anhedonia play a role in this relationship can help us better understand different depressive symptoms and their observed outcomes.

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