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Examining the Genetic and Environmental Relationship between Parent Personality and Childhood Deviance

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EXAMINING THE GENETIC AND ENVIRONMENTAL RELATIONSHIP BETWEEN PARENT PERSONALITY AND CHILDHOOD DEVIANCE

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Abstract

The purpose of this project was to examine the relations between parent personality and child externalizing behaviors (e.g., acting out, aggression). To do this, parent personality, child temperament, and externalizing behaviors in children were examined. To further understand the role of genetics vs. environmental influences, identical (MZ; monozygotic) twins and fraternal (DZ; dizygotic) twins were compared. This allowed the percentage of the relation that was due to shared environment between the parent and the child versus the percentage of the relation that was due to genetic commonalities between the parent and child to be examined. For this study, archival data from twins aged 5 to 10 years and their parents were used. Additionally, supplemental data from families that were missing data from one age were collected. Several questionnaires were used to assess the personality of the parents, as well as the temperament and behaviors of the children. It was found that parent personality was not related to externalizing behaviors in children, but childhood temperament, specifically adaptability, was related to externalizing behaviors in children. Furthermore, it was found that parent personality was related to childhood temperament, which could indicate an indirect link between parent personality and externalizing behaviors via child temperament. Lastly, it was found that these relations were in part due to shared genes between the parents and the children, indicating that genes also play a large role in the behaviors of children and that it is not only the environment in which they are raised that is important.

Examining the Genetic and Environmental Relationship between Parent Personality and Childhood Deviance

The relations between externalizing behaviors and the "Big 5" personality traits have been examined in several studies, as have the relations between temperament and the "Big 5" personality traits. Furthermore, the relation between childhood temperament and externalizing behaviors have also been examined. In the present study, the relations between "Big 5" personality traits in parents, temperament in children, and externalizing behaviors in children were examined. Before these relations were explored in the present study, previous research on the "Big 5", child temperament, and externalized behavior was reviewed. First and foremost, what are externalizing behaviors? Tackett, Herzhoff, Reardon, De Clercq, and Sharp (2014), in their study examining the externalizing spectrum in youth, describe externalizing behaviors as inattention and hyperactivity, delinquency, and substance abuse. Typically in youth, externalizing behaviors are characterized by physical aggression and rule-breaking (Tackett et al., 2014).

Personality and Externalizing

Krueger, McCue, and Iacono (2001) explored the relations between personality and externalizing behaviors using a three-factor model. They examined common mental disorders in the DSM (III-R), internalizing and externalizing, and their relations to personality. They assessed personality using the Multidimensional Personality Questionnaire (MPQ), which breaks personality into a three-factor model. The three factors are: positive emotionality (propensity to experience positive emotions resulting from active engagement in work/social environments), negative emotionality (propensity to experience negative mood, such as anxiety, anger, alienation from others), and constraint (propensity for caution and restrained behavior, endorsement of traditional values). Internalizing was related to higher negative emotionality and lower positive

emotionality, while externalizing was related to lower constraint (Krueger et al., 2001). The results of these studies support how personality may be related to externalizing behaviors.

As we can see from Krueger et al. (2001) externalizing is often associated with specific personality traits (i.e., lower constraint). The "Big 5" personality model, as described by McCrae and Costa (2003), is a five-factor model that is broken down into neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Worrying, being temperamental, vulnerable, emotional characteristics, and having self-pity represent neuroticism. Talkative, fun-loving, joining, and active characteristics represent extraversion. Openness to experience is represented by imaginative, creative, curious, and liberal characteristics. Agreeableness is represented by softhearted, trusting, lenient, and good-natured characteristics. Lastly, conscientiousness is represented by hard-working, well-organized, punctual, and ambitious characteristics (McCrae & Costa, 2003). It was hypothesized in the present study that a parents' individual scores on these traits (high vs. low) will be related to externalized behavior in children (Ehrler & Evans, 1999; DeYoung et al., 2008; Settles et al., 2011), which has not been previously examined.

Individuals' scores on the specific "Big 5" personality traits (high v. low) are related to externalizing behaviors. Ehrler and Evans (1999) examined 68 nine- to 13-year-old boys who were rated by their teachers on a survey derived from the NEO Personality Inventory – Revised. Those who scored low on agreeableness and conscientiousness exhibited social problems, conduct problems, attention deficits, and hyperactivity. Children who scored low on openness displayed problems in social behavior, conduct, and attention. Furthermore, those who scored high on neuroticism experienced social problems and behaviors associated with depression and anxiety (Ehrler & Evans, 1999). DeYoung, Peterson, Séguin, and Tremblay (2008) examined 140

13-year-old boys and broke down the five-factor model into two categories: 1) stability (reversed neuroticism, conscientiousness, and agreeableness), as described by DeYoung et al. (2008) reflects stable functioning in emotional, motivational, and social domains; and 2) plasticity (extroversion and openness to experience) reflects the tendency to explore behaviorally and cognitively. Externalizing behaviors were characterized by low stability, high plasticity, and low cognitive ability. Cognitive ability was only narrowly associated with predicted externalizing behaviors.

Settles and colleagues (2011) examined negative urgency, which is defined as the tendency to act rashly when distressed. This is characterized by high neuroticism rates, low conscientiousness, and low agreeableness. In contrast to previous studies that examined male populations, Settles et al. (2011) examined 111 females, ages ranging from 22-56 years. Negative urgency predicted alcohol dependence symptoms in older women, drinking problems and smoking status in preadolescents, and aggression, risky sex, illegal drug use, drinking problems, and conduct disorder in college age students. Negative urgency was a predictor of externalizing dysfunction (Settles et al., 2011).

"Big 5" Personality and Parenting

It is also important to understand how the five-factor model of personality is related to parenting techniques and styles. The relation between parent personality traits, parenting behaviors, and adolescents has been examined. Oliver, Guerin, and Coffman (2009) investigated the families of 130 children, assessing the children, ranging in age from 13-17 years old. The NEO Five-Factor Inventory was used to assess the parent personality based on the big-five factors. The Parent-Child Relationship Inventory was used to assess the parent-child relationship at the 15- and 16-year-old assessments points. The Child Behavior Checklist and the Youth Self-

Report were also used when the children were 17 years old to identify specific child behaviors. There was a link between conscientiousness in mothers and externalizing behaviors in adolescents. However, the personality traits of the fathers were unrelated to behavior problems in adolescents. There was not a clear relation between the mothers' and fathers' neuroticism ratings and problem behaviors during adolescence (Oliver et al., 2009).

It has also been reported that personality as rated by the five-factor model directly impacts parenting styles, which is important in understanding how children's environment can influence their behaviors. De Hann, Prinzie, and Deković (2009) examined 480 families across six years, rating the parents on their personality, over-reactivity, warmth/involvement, and sense of competence. More extroverted and agreeable parents showed a lower level of over-reactivity and higher levels of warmth toward their children.

To further examine the role of environmental impact on child development and how a child may directly impact their own environment, Vanschoonlandt, Vanderfaeillie, Van Holen, De Maeyer, and Robberechts (2013) studied the relation between parenting stress/behavior among foster mothers and externalizing problems in 39 foster families. The foster mothers who had children experiencing externalizing problems exhibited more stress than the norm group, which were foster families that experienced no externalizing problems and had moderate to significant problems on the parenting subscales. The subscales were rated from 1 to 4: 1) not feeling able to cope, 2) experiencing problems in parenting the child, 3) experiencing the child as a burden, and 4) wanting the parenting situation to be different. The externalizing problems of the children, however, did not have a negative influence on the parenting styles of the foster mothers. This could be attributed to the foster mothers being trained to deal with externalizing behaviors in children (Vanschoonlandt et al., 2013). Additionally, McCullough and Shaffer (2013) examined

the relation between maternal depressive symptoms, externalizing behaviors in children, and emotionally maltreating parenting behaviors. They studied 62 mother-child relationships, the children being between 8-11 years old. They scored the mothers' depressive symptoms using the Symptom Checklist-90-Revised, and the child behavior problems using the Child Behavior Checklist, and they examined the parenting behaviors as a moderator between these two factors. The mothers' emotionally maltreating parenting behaviors moderated the relation between maternal depressive symptoms and the externalizing behaviors in the children. This relation was only significant at higher levels of emotionally maltreating parenting behaviors. As expected, low levels of maternal depressive symptoms in addition to low levels of emotionally maltreating parenting behavior were related to low levels of externalizing problems in children (McCullough & Shaffer, 2013).

From previous research it can be inferred that a parent's personality, based on the "Big 5" model, can directly impact parenting (DeHann et al., 2009; Oliver et al., 2009). Additionally, previous research has shown that depressed parents can impact the behaviors of their children (McCullough & Shaffer, 2013) and that with proper training parents can learn to deal with problem behavior in children (Vanschoonlandt et al., 2013). This previous research shows the importance of environmental impact on children's behavior. The personality of a parent, the training they are given, or the illness they experience are all factored into environmental impact. In the current study, this research was used to understand the environmental relation between parent personality and externalizing behaviors in children.

Temperament and Personality

In addition to a relation with externalizing behaviors, the "Big 5" personality traits are also related to temperament in several ways. Caspi and Silva (1995) examined over 800

individuals to understand the relation between behavioral styles at age 3 and personality traits at age 18. They examined 5 temperament groups: under-controlled, inhibited, confident, reserved, and well-adjusted. When the children were age 3, temperament was measured based on the child's behavioral style. These behavioral styles fell into three scores based on the cluster-analytic method: Lack of Control, Sluggishness, or Approach. Based on these scores the children were placed into a temperament group. When the children turned 18 they were given the Multidimensional Personality Questionnaire (MPQ), a self-report personality measure. Under-controlled children at age 3 scored high on impulsivity, danger seeking, aggression, and interpersonal alienation at 18. Inhibited children at age 3 scored low on impulsivity, danger seeking, aggression, and social potency at 18. Confident children at age 3 scored high on impulsivity at 18. Reserved children at age 3 scored low on social potency at 18. Lastly, well-adjusted children at age 3 did not score high or low on the MPQ and continued to display "normal" behaviors. It can be inferred from this research that temperament at age 3 held across childhood development, predicting personality at age 18 (Caspi & Silva, 1995).

This research is supported by later research done by Caspi et al. (2003), which also examined the temperament of children at age 3. In this study, however, personality traits were examined at age 26. A total of 980 participants were examined both at age 3 and at age 26. When the children were 3 they participated in a 90-minute developmental test and these same children were clustered into five types: well-adjusted, under-controlled, confident, inhibited, and reserved. When the participants turned 26 they were given the Multidimensional Personality Questionnaire (MPQ), which is broken down into five traits: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. It was found that children who were rated as under-controlled (irritable, impulsive, emotionally labile) at age 3 scored high on negative

emotionality traits at age 26. These participants as adults were easily upset, likely to overreact, felt mistreated, deceived, and betrayed by others. Furthermore, children who were rated as inhibited at age 3 (shy, fearful, socially ill at ease) were found to be over-controlled and nonassertive at age 26. These participants as adults had little desire to exert their influence over others and reported having little pleasure in life. The other three temperament groups were also consistent over time: confident children at 3 were described as extraverted at age 26 and reserved children at age 3 were described as introverted at age 26. Lastly, well-adjusted children were described as average adults at 26 (Caspi et al., 2003). These two studies show that temperament at a young age can be a solid predictor of personality in adulthood.

Temperament and Externalizing

Temperament is also related to externalizing behaviors. Kerreman, de Haas, van Tuijl, van Aken, and Deković (2010) examined the relation between temperament, parenting, and problem behaviors in 89 two-parent families with roughly 36 month old children. The parents filled out questionnaires about their children's problem behaviors and temperament. Externalizing behaviors were measured using the Strengths and Difficulties Questionnaire (SDQ) and the Child Behavior Questionnaire (CBQ) was filled out by mothers, fathers, and preschool/playgroup teachers. Of the CBQ subscales, hyperactivity and conduct problems were used. Temperament was measured using the Child Behavior Questionnaire (CBQ) which was filled out by both mothers and fathers and broken down into subscales: anger/frustration, sadness, fear, and impulsivity. Impulsivity and anger temperaments were found to be positively associated with externalizing problems in the children (Kerreman et al., 2010).

Berdan, Keane, and Calkins (2008) examined parent-rated temperament in pre-kindergarten children as a predictive factor for externalizing behaviors in kindergarten

classrooms. They also examined how social preference and perceived acceptance mediated these factors. A total of 399 children were rated by their parents at age 4.5 (pre-kindergarten) using the Child Behavior Checklist (CBCL) and again at age 5 using the Child Behavior Questionnaire (CBQ). Findings indicated that the pre-kindergarten children who were highly temperamental, falling into the Surgency/Extraversion category were more likely to exhibit hyperactivity and aggression (characteristics of externalizing) in kindergarten. In addition, social preference and perceived acceptance was a mediating factor between these two variables, but only for girls (Berdan et al., 2008). From these studies, it was inferred that temperament and externalizing behaviors are related to one another. Additionally, from Berdan et al. (2008) we can see that externalizing may, in part, be due to environment.

Genetic and Environmental Influence

The environment that a child lives in can greatly impact his or her development, but what about the child's genes? Over the years, the study of gene-environment interaction has flourished. It is understood that both genes and environment work together, but it is how they work together to influence behavior and which genes are responsible for these behaviors that is truly important. Children who play with aggressive peers act more aggressively (DiLalla, 2002). It is important to ask, however, why these children are choosing more aggressive peers to play with in the first place. An examination of both genetic and environmental influences is important to address this question. There are two major ways to study influences from genes and from environment, the first being twin studies in which researchers compare identical (who share 100% of their genetic make-up) and fraternal twins (who share 50% of their genetic make-up) and their shared environments. This provides the researchers an understanding of the behaviors that are based on inherited traits and behaviors that are learned. Another way to examine how genes and

environment influence behaviors is to examine adoption studies and compare the behavior of the child to the genes passed down from their parents (hereditary) and the environment provided to them by their adoptive families (learned; DiLalla, 2002). For the purpose of this current review, twin studies were the main focus.

Twin studies are particularly interesting to examine because they provide researchers the opportunity to observe how genes and environment influence the behaviors of children growing up in the same shared environment. For instance, if the siblings lose a parent, this will impact a 2-year-old child differently than their 5-year-old sibling. However, if we observe twins who have lost a parent, they are both experiencing this event at the same age, thus eliminating the age confound. Lamb, Middeldorp, Van Beijsterveldt, and Boomsma (2011) examined the genetic and environmental relation of internalizing and externalizing behaviors in almost 9,000 7- to 12-year-old twins. The internalizing or externalizing behaviors of the twins were teacher-rated and 60% of the twin pairs were rated by the same teacher. Heritability estimates for internalizing and externalizing behaviors were obtained by comparing twins who were rated by the same teacher and twins who were rated by different teachers. For the twins who were rated by the same teacher internalizing problems were about 70% heritable for internalizing problems and externalizing problems were 70% heritable for girls and 80% heritable for boys. For the twins who were rated by different teachers internalizing was 30% heritable and externalizing problems were 50% heritable. From this research it can be inferred that by being taught in different environments, with different teachers, behaviors may be affected and environment may play a larger role in these behaviors. It may be that being in similar environments (same teacher) may contribute to similar displays of internalizing and externalizing behaviors in twins or that there are biases in the teacher ratings (Lamb et al., 2012).

Conclusions and Hypotheses

As reviewed above, previous research has examined the relations between personality and externalizing behaviors. Personality research has shown a relation between personality and externalizing behaviors (DeYoung et al., 2008; Ehrler & Evans, 1999; Krueger et al., 2001; Tackett et al., 2014; Settles et al., 2011). This relation occurs directly and also can influence children through parenting styles that are influenced by their parents' personality (De Hann et al., 2009; McCullough & Shaffer, 2013; Oliver et al., 2009; & Vanschoonlandt et al., 2013). A relation between childhood temperament and externalizing behaviors have also been examined (Kerreman et al., 2010) as well as a relation between the "Big 5" and childhood temperament (Caspi & Silva, 1995). Behavior genetic studies (e.g., DiLalla 2002) contribute to a better understanding of the impact of genes and environment influences and help estimate the percentage of variance that is due to genetic influence and the percentage that is due to environment.

In the current study, parent personality, child temperament, and child externalizing behaviors were examined together to better understand the relations between these factors. It was hypothesized that both parent personality and childhood temperament would influence externalizing behaviors in children. Additionally, it was hypothesized that childhood temperament would be an indirect link between parent personality and externalizing behaviors. Parent personality would influence childhood temperament, which would then influence externalizing behaviors in children. Lastly, it was hypothesized that child personality and children's externalizing behaviors would be partly genetic in origin. Therefore the correlations between monozygotic twins (MZ; identical) would be higher than dizygotic twins (DZ; fraternal) due to shared genes between the children, indicating that because monozygotic (MZ) twins share

nearly 100% of their genes that genetics play a substantial role in externalizing behaviors.

Methods

Participants

Participants in the current study were a total of 69 monozygotic (MZ) and dizygotic (DZ) twin/triplet pairs, ages five to ten, and their parents. The children have participated in the Southern Illinois Twins and Siblings Study (SITSS; DiLalla, 2002; DiLalla, Gheyara & Bersted, 2013) either at age five or during the follow-up study conducted by SITSS at ages six to ten. For this study, archival data that consisted of questionnaires completed by the participants' parents when the children were five years old were used and self-report data completed by the children when they returned for the follow-up study when they were between ages six and ten were also used. To augment this current sample, the families that only participated in the follow-up study (ages six to ten) were mailed a questionnaire for the parents to complete. Additionally, families that only participated at age five and not during the follow-up study were contacted via phone and asked to complete a phone interview to obtain the child data when children are aged 6 to 10 years old. Due to the children pariticpating in the study at different ages and the use of archival data, the sample size varies for the different variables used in this study (see Table 1).

Measures

As part of SITSS several measures were administered and completed by either parent or children. The measures assess parent self-rated personality, parent-rated childhood temperament, child self-rated peer victimization, and child self-rated externalizing and internalizing problems.

Measures Used At Age Five

Behavioral Styles Questionnaire (BSQ; McDevitt & Carey, 1978). Age five temperament characteristics were measured using the Behavioral Styles Questionnaire (BSQ)

created by McDevitt and Carey (1978). This is a parent-report measure comprised of 100 items using nine subscales. The items are scored using a 6-point Likert scale from “almost never” to “almost always”. The questions can range from, “The child cries intensely when hurt” to “The child looks up from playing when the telephone rings”. These items are summed to create a score for each of the subscales: Activity level, Rhythmicity, Approach-withdrawal, Adaptability, Intensity, Mood, Threshold, Distractibility, and Persistence. Specifically, for this project adaptability, intensity, and mood were used due to their relation with externalizing behaviors. The BSQ is shown to be reliable using the test-retest method, Cronbach’s alpha = .89 (McDevitt & Carey, 1978). Furthermore, the BSQ also shows internal consistency reliability, Cronbach’s alpha = .84 (McDevitt & Carey, 1978).

Parent Personality Questionnaire (PPQ; Tellegen, 1982; Saucier, 1994). The Parent Personality Questionnaire (PPQ) for the SITSS includes a 30-item aggression subscale from the Differential Personality Questionnaire, now called the Multidimensional Personality Questionnaire (DPQ/MPQ; Tellegen, 1982) and the 40-item Mini-Markers adjective checklist created by Saucier (1994). The MPQ items are answered on a true/false scale and the 40-item adjective checklist items are answered using a 9-point scale from extremely inaccurate (1) to extremely accurate (9). The aggression subscale is reliable for both males (Cronbach's alpha = .84) and females (Cronbach's alpha = .76). The aggression items consist of statements such as “I enjoy violent movies”. On the adjective checklist, adjectives are presented such as “bold,” “quiet”, or “warm”, which the parent rates on the 9-point scale. Using these adjectives 5 factor scores are created: Factor I (extraversion), Factor II (agreeableness), Factor III (conscientiousness), Factor IV (emotional stability), and Factor V (intellect or openness). Each of the five factors demonstrated reliability based on Saucier (1994): Factor I (Cronbach's alpha =

.83), Factor II (Cronbach's alpha = .81), Factor III (Cronbach's alpha = .83), Factor IV (Cronbach's alpha = .78), and Factor V (Cronbach's alpha = .78; Saucier, 1994).

Follow-Up Study Measures

Multidimensional Peer-Victimization and Bullying Scale (MPVBS; altered from Mynard & Joseph, 2000 by Biebl, 2011). The children's self-reported victimization and bullying behavior during the follow-up study (ages six to ten) were measured using the Multidimensional Peer-Victimization and Bully Scale (MPVBS), an altered version of the MPVS (Mynard & Joseph, 2000) that was created by Biebl (2011) for her thesis. The MPVBS is a 48- item questionnaire rated on a 5-point Likert-type scale (0 = never, 1 = 1 time 2 = 2-5 times, 3 = 6-10 times, and 4 = 10+ times) with six impairment follow-up questions on similar 5-point Likert scales (1 = not at all, 3 = some, and 5 = very much). The questions were altered from the original MPVS to measure bullying of others (i.e., "How many times have other kids punched you?" has been altered to "How many times have you punched other kids?"). Three of the four subscales for the MPVBS were reliable based on Biebl (2011): physical bullying (Cronbach's Alpha = 0.85), verbal bullying (Cronbach's Alpha = 0.76), social manipulation (Cronbach's Alpha = 0.57), and attacks on property (Cronbach's Alpha = 0.79). Furthermore, Biebl (2011) showed that the Relational Bullying scale (Cronbach's Alpha = 0.87) and Physical Bullying scale (Cronbach's Alpha = 0.80) were reliable.

Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001). The self-report version of the Strength and Difficulties Questionnaire (Goodman, 2001) was used. This questionnaire is used to measure the internalizing and externalizing problems self-reported by children six to ten years of age. The SDQ is a 25-item questionnaire and the children respond by using a 3-point Likert-type scale (0 = not true, 1 = somewhat true, 2 = very true). The items

include statements such as, “You try to be nice to other people. You are about their feelings” and “You worry a lot”. These items load on five subscales that contain five items each. The subscales are: hyperactivity, emotional symptoms, conduct problems, peer problems, and prosocial scale. High reliability was found in a sample of 5-to 16-year-old children by using two higher order factors (Goodman, 2010). Externalizing is the first higher order factor, which is comprised of the conduct problems and hyperactivity subscales (Cronbach's alpha = .72). The second is Internalizing which is comprised of the emotional problems and peer problems subscales (Cronbach's alpha =.74). The Externalizing higher order factor was utilized in this study.

Procedure

Procedure for age five measures. Most of the archival data were collected when the children were 5 years old. During this testing the parents filled out questionnaires such as the PPQ and the BSQ. To supplement archival data already collected by SITSS, the parents of children who participated in the follow-up study (ages six to ten) but did not participate at age five were mailed the Parent Personality Questionnaire, along with a letter of intent, consent form, contact form, and invoice voucher. Six parents were compensated $10 for the time taken to complete the PPQ.

Procedure for follow-up measures. The archival data collected during the follow-up study was gathered when the children were 6-10 years old. The children were tested in the lab and completed both the SDQ and MPVBQ. To supplement archival data collected during a follow-up study completed by SITSS, children who participated at age five but did not participate during the follow-up study were contacted via their parents. If parents and children were willing to participate, a phone interview was conducted and the children were compensated $15 each for their time. Nine twin/triplet families completed the phone interviews and were

compensated. First, a packet of information (letter of intent, consent form, assent form, contact sheet, Likert scales, and invoice voucher) was mailed to the families. After the packets were received and the consent and assent forms were signed, a phone interview, taking approximately 25 minutes for each child, was completed. The phone interview was completed in the SITSS laboratory, in room 224 of Life Sciences II on SIUC campus. The children were provided with pictures to help them answer the questions. For example, the children completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 2011) during the phone interview and were provided bubblegum machine pictures to show the degree to which they agree with something (i.e. if the bubblegum machine is halfway full, they sometimes agree with something). Twin 1 completed the phone interview first and then Twin 2 completed the phone interview. When the interview was completed, the invoice vouchers were processed and the parents of the children were mailed a $30 check for both children or each child was individually mailed a $15 check, based on parent preference. For the children to be individually mailed a check, their social security number must have been provided. Many of the parents preferred not to disclose this information and choose to have one check for $30 mailed to them.

Results

Both regression and correlation analyses were used to analyze the data for the current project. In this study parent personality and childhood temperament were expected to influence externalizing behaviors in children. It was also expected that childhood temperament would be an indirect linking factor between parent personality and childhood externalizing behaviors. Refer to Table 1 for descriptive statistics of this study.

Hypothesis 1

It was hypothesized that both parent personality and childhood temperament would

influence externalizing behaviors in children. To investigate this hypothesis a regression analysis of child externalizing behaviors on child temperament and parent personality was conducted. In this regression child temperament was entered in Step 1, specifically examining adaptability, intensity, and mood, and parent personality was entered in Step 2, specifically examining agreeableness, conscientiousness, and emotional stability. It was found in this regression that the total model was not significant when predicting externalizing behaviors in children, $F(6, 46) = 1.6$, $p = .160$. However, the step 1 model was significant, which suggests that childhood temperament was significant when predicting externalizing behaviors in children, $F(3, 46) = 2.8$, $p = .049$. Adding parent personality did not improve the model, but in fact made it worse. These results indicate that, contrary to previous research, parent personality has little relation to externalizing behaviors, but childhood temperament plays an important role. When further examining the steps of the regression analysis it was found that within child temperament, adaptability shows significance when predicting externalizing behaviors in children (see Table 2).

To further investigate other types of externalizing behaviors, a regression analysis of physical bullying on child temperament and parent personality, with child temperament in Step 1 and parent personality in Step 2, was used. Again, it was found that adaptability specifically was significant (see Table 3). This significance was not found when using a regression analysis of verbal bullying on child temperament and parent personality (see Table 4). This indicates that adaptability, not intensity or mood, plays an important role when predicting physical externalizing behaviors, but not all externalizing behaviors. Thus, hypothesis 1 was partially supported.

Hypothesis 2

It was hypothesized that childhood temperament would be an indirect link between parent personality and externalizing behaviors. Parent personality would influence childhood temperament, which would then influence externalizing behaviors in children. To investigate this hypothesis, parents' emotional stability and children's negative emotionality (a combination of adaptability, intensity, and mood) were specifically examined. A regression analysis indicated that parent personality (emotional stability) was not significant when predicting children's SDQ externalizing, $F(1, 54) = .01$, $p = .913$, physical bullying, $F(1, 54) = 1.2$, $p = .274$, or verbal bullying, $F(1, 54) = 1.7$, $p = .202$. However, childhood temperament (negative emotionality) was significant when predicting SDQ externalizing, $F(1, 48) = 3.7$, $p = .059$ and physical bullying, $F(1, 48) = 5.7$, $p = .020$, but not verbal bullying, $F(1, 48) = 1.8$, $p = .181$.

Additionally, it was found using a regression analysis that parent personality (emotional stability) was significant when predicting childhood temperament (negative emotionality), $F(1, 45) = 10.5$, $p = .002$. As stated above, childhood temperament is significant when predicting externalizing behaviors in children. Thus, we see an indirect effect of parent emotional stability on child externalizing via child temperament as expected (see Figure 1) and hypothesis 2 was supported.

Hypothesis 3

It was hypothesized that child temperament and children's externalizing behaviors were partly genetic in origin. To determine whether externalizing behaviors and temperament are partly genetic in origin intra-class correlations of MZ and DZ twins were used. It was found, as expected, that the correlations between the MZ twins were higher than the correlations between the DZ twins for child temperament (specifically looking at adaptability, intensity, and mood), children's externalizing behaviors, and children's physical bullying behavior (see Figures 2 and

3). To further understand these relationships, heritability ($h^2 = 2(r_{MZ} - r_{DZ})$) was calculated for each variable. Each relationship was found to be heritable, with a range from .18 (physical bullying) to .90 (intensity; see Figures 2 and 3). However, it was found that verbal bullying showed no evidence of heritability (see Figures 2 and 3). These correlations indicate that child temperament and child externalizing behaviors and physical bullying behavior are at least partly genetic in origin. Thus, hypothesis 3 was supported.

Discussion

The results of this study aid in the understanding of what is presently known about the relation between parent personality, child temperament, and externalizing behaviors in children. The present study provides contrary evidence to previous research on the connections between parent personality and child externalizing behaviors, but also supports previous research on the connection between child temperament and child externalizing behaviors. The findings from this study indicated that parent personality does not predict externalizing behaviors in children of this sample, which is contrary to previous research (DeYoung et al., 2008; Krueger et al., 2001; Settles et al., 2011). These results do, however, indicate that child temperament, specifically the ability to adapt, does predict externalizing behaviors in children in this sample. We also see that parent personality predicts childhood temperament (a combination of adaptability, intensity, and mood). From these results, an indirect link between parent personality and child externalizing behaviors via childhood temperament can be seen. Furthermore, this study shows that MZ and DZ twins differed significantly for child temperament (adaptability, intensity, and mood), externalizing behaviors, and physical bullying behaviors, indicating that these behaviors are partly genetic in origin and highly heritable.

Personality and Externalizing

Contrary to previous research, this study found no relation between parent personality and externalizing behaviors in children. Based on previous research, it was expected that parent personality, specifically parents' scores on agreeableness, conscientiousness, and neuroticism (emotional stability reversed) would predict externalizing behaviors in children (DeYoung et al., 2008; Ehrler & Evans, 1999; Settles et al., 2011). While little research has been done on the direct relation between parent personality and externalizing behaviors in children, Ehrler and Evans (1999) found that children who scored low on agreeableness and conscientiousness experienced social problems, conduct problems, and hyperactivity. Furthermore, DeYoung et al. (2008), found that children with externalizing behaviors were characterized by low stability (high neuroticism, low conscientiousness, low agreeableness) and high plasticity (high extroversion and high openness to experience). This research led to the hypothesis that parent personality would directly impact children's externalizing behaviors, either through shared genes or shared environment. However, a relation was not found.

Temperament and Personality

In support of previous research, this study found a connection between personality and temperament in children. In this study it was found that parent personality (emotional stability) was a strong predictor of child negative emotionality. Past research has shown a connection between temperament in children and personality later in life. Caspi and Silva (1995) found that children who scored as under controlled temperament at age 5 later displayed impulsive, danger seeking, aggressive behaviors at age 18. Based on this research, it was expected that parents who scored low on emotional stability would have children who scored high on negative emotionality (a combination adaptability, intensity, and mood). This relation was found in this study.

Temperament and Externalizing

Also in support of previous research, this study found a relation between childhood temperament and externalizing behaviors in children. Previous research has indicated that children who scored high on the impulsive and anger subscales of the Child Behavior Questionnaire (CBQ) were found to have more externalizing problems (Kerreman et al., 2010) and that children who scored as highly temperamental on the CBQ were more likely to be hyperactive and aggressive (both characteristics of externalizing behaviors). Based on this research, three of the Behavior Styles Questionnaire (BSQ) subscales, adaptability, intensity, and mood, were examined (both individually and together as negative emotionality), in relation to externalizing behaviors. It was found that a child's ability to adapt to new situations was highly correlated with externalizing behaviors.

Genetic and Environmental Influence

Lastly, in line with previous behavior genetics research (Lamb et al., 2011), it was found in this study that childhood temperament and physical externalizing behaviors in children were due in part to genes passed from the parent to the child. The correlations between MZ twins were higher than the correlations for DZ twins, which is consistent with twin research (DiLalla, 2002). These behaviors are highly heritable which indicates a genetic link. Lamb et al. (2012) found that externalizing problems were 70% heritable for girls and 80% heritable for boys, findings from the current study indicated externalizing problems were 32% heritable for both genders and physical bullying behaviors were 17% heritable for both genders. With a larger sample size, it may be possible to find higher heritability for these traits.

Implications

One possible explanation of the connection between the ability to adapt in children and externalizing behaviors could be that children who are slow to adapt to new

situations/environments are becoming frustrated and this frustration leads to aggression, rule breaking, and bullying. Future research should investigate a possible link between the ability to adapt in children and frustration in children, as frustration may be a mediating link between these variables. Additionally, future research should examine how the children's environments contribute to slow adaptation and what is occurring in these slow-to-adapt situations. Are children becoming frustrated? Do they lash out? Further exploration of this connection could be crucial in understanding possible triggers for aggressive, bullying, and rule breaking behavior.

The ability to pin-point a child's ability to adapt as a predictor of these types of behaviors allows us to target adaptability in young children and teach methods for adapting to new environments and situations. It also shows that children who struggle to adapt at a young age may be at risk for slow adaption at an older age and could be at risk for exhibiting externalizing behaviors. Future research should also consider exploring sex differences in externalizing behaviors. It is possible that boys and girls will act differently in different environments and may experience externalizing behaviors in different ways.

Furthermore, it is possible that parents' personality may have an indirect effect on children's physical externalizing behaviors via childhood temperament. It is possible that parents who have low emotional stability (therefore, having high neuroticism) may be passing these temperament traits to their children, either genetically or through shared environment with the children. In this study it was found that child temperament is highly heritable, which supports the genetic link. Future research should consider examining the relation between parent personality and parent physical externalizing behaviors. Additionally, to further disentangle the genetic and environmental relation researchers should consider using the adoption study method.

Strengths and Limitations

A major strength of this study is its multi-method, multi-informant approach. During this study both self-report questionnaires were used for the parents and the children and parent-reported questionnaires were used for the children's behavior. From both types of reporting we found significant results.

However, the current study has several limitations. First, for this study we utilized parent-reported measures of temperament for the children at age 5. There were no temperament measures taken when the children were 6 to 10. This can potentially skew results because parents rated their child's temperament based on their own perspective, which creates a rater bias. Future studies should use a self-rated measure for temperament of children.

Additionally, for this study externalizing behaviors were only self-rated by the children and personality was only self-rated by the parents. This self-report can cause errors in the data due to personal biases or lack of honesty when answering questionnaires. Future studies should consider having both the parents and the children report on all behaviors.

This study also had a low sample size which can make it difficult to find significant results and to replicate the results of this study. This could be why a relation was not found between parent personality and externalizing behaviors in children. Future studies should attempt to gain a larger sample size before analyzing data.

Lastly, this study was done in both a lab setting and over phone interviews. The phone interviews, unfortunately, made it more difficult to guide the children when there was confusion and allowed for more distractions than the lab setting. Therefore, the questionnaires done during phone interviews may not have completely accurate answers. Future studies should consider completing the entire study in the same setting.

Conclusion

This current study explored the relation between parent personality, child temperament, and externalizing behaviors in 5 to 10-year-old identical and fraternal twins. It was found that parent personality did not predict externalizing behaviors in children. However, child temperament, specifically adaptability, did predict externalizing behaviors. Additionally, it was found that parent personality (emotional stability) predicts childhood temperament (negative emotionality), which indicates an indirect link between parent personality and externalizing behaviors via child temperament. This link may be due to shared genes between the parent and children or due to shared environment, but heritability estimates show that these behaviors are at least partly genetic in origin.

Understanding the causes, both genetic and environmental, of externalizing behaviors is crucial in preventing aggressive and bullying behaviors among children and adolescents. By furthering our understanding of possible genetic predispositions for acting out, rule-breaking, and bullying behavior we can prevent these behaviors at an early age. Additionally, if we understand triggers in a child's environment that can cause externalizing behaviors, such as frustrating situations that a child cannot adapt to, we can prevent these triggers and teach children new ways to adapt to frustrating situations. This study aids in the understanding of why children exhibit externalizing behaviors and gives insight into how we can prevent these behaviors.

Table 1

Descriptive Statistics for Variables

Statistic	N	Mean	Std. Deviation
Parent Personality			
Agreeableness	56	7.5	.82
Conscientiousness	56	6.7	1.2
Emotional Stability	56	5.7	1.3
Child Temperament			
Adaptability	51	2.6	.69
Intensity	51	4.4	.60
Mood	51	3.1	.78
Negative Emotionality	49	10.2	1.7
Externalizing + Bullying			
SDQ Externalizing	69	6.5	3.6
Physical Bullying	69	.25	.50
Verbal Bullying	69	.39	.56

Table 2

Regression of Child Externalizing behaviors on Child Temperament and Parent Personality				
	β	*t*	*p*	*Adj. R^2*
Step 1 - Child Temperament				.107
Adaptability	**2.83**	**2.59**	**.013**	
Intensity	-0.025	-0.022	.982	
Mood	-0.837	-0.734	.467	
Step 2 – Parent Personality				.07
Agreeableness	.268	.358	.722	
Conscientiousness	-0.015	-0.027	.978	
Emotional Stability	.480	1.05	.299	

Table 3

Regression of Physical Bullying on Childhood Temperament and Parent Personality				
	β	*t*	*p*	*Adj. R^2*
Step 1 - Child Temperament				.171
Adaptability	**.264**	**2.11**	**.041**	
Intensity	.020	.151	.881	
Mood	-0.004	-0.034	.973	
Step 2 – Parent Personality				.210
Agreeableness	.099	1.16	.158	
Conscientiousness	.044	.715	.479	
Emotional Stability	-0.015	-0.295	.769	

Table 4

Regression of Verbal Bullying on Childhood Temperament and Parent Personality				
	β	*t*	*p*	*Adj. R^2*
Step 1 - Child Temperament				-.002
Adaptability	.153	.965	.340	
Intensity	-0.041	-0.251	.803	
Mood	.060	.362	.719	
Step 2 – Parent Personality				-.058
Agreeableness	.042	.388	.700	
Conscientiousness	.047	.594	.566	
Emotional Stability	-0.041	-0.612	.544	

Figure 1

Linking Model of Parent Emotional Stability, Child Negative Emotionality, and Child Externalizing

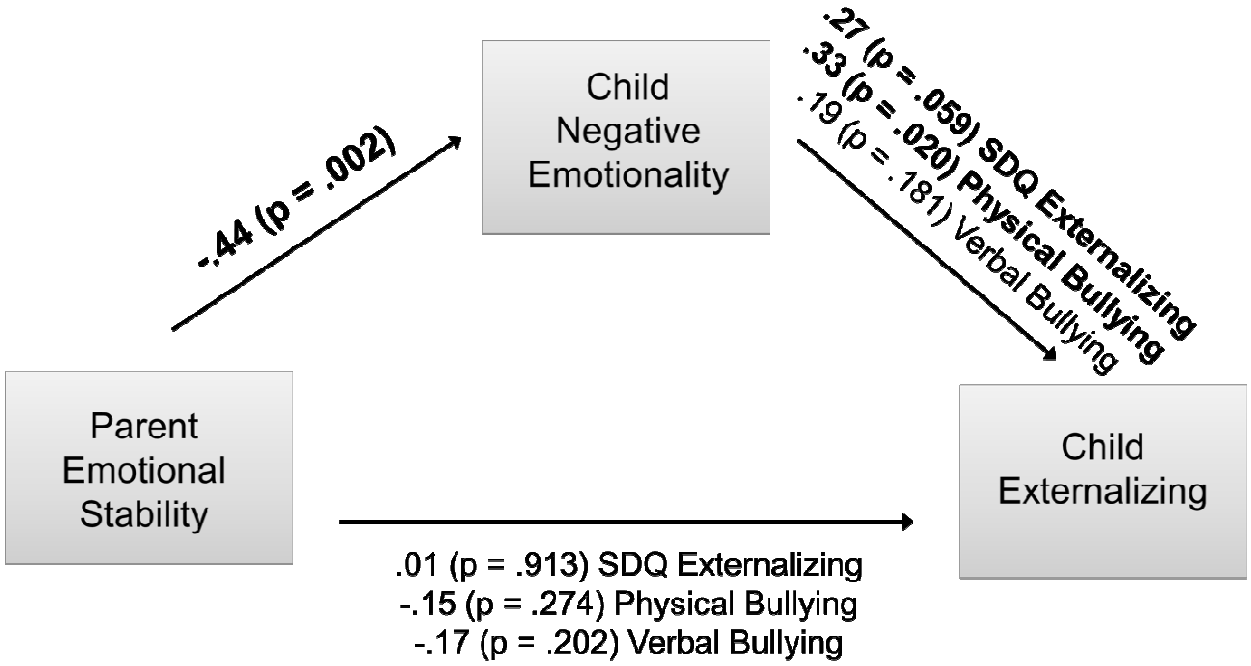


Figure 2

Intra-class Correlations on Problem Behaviors

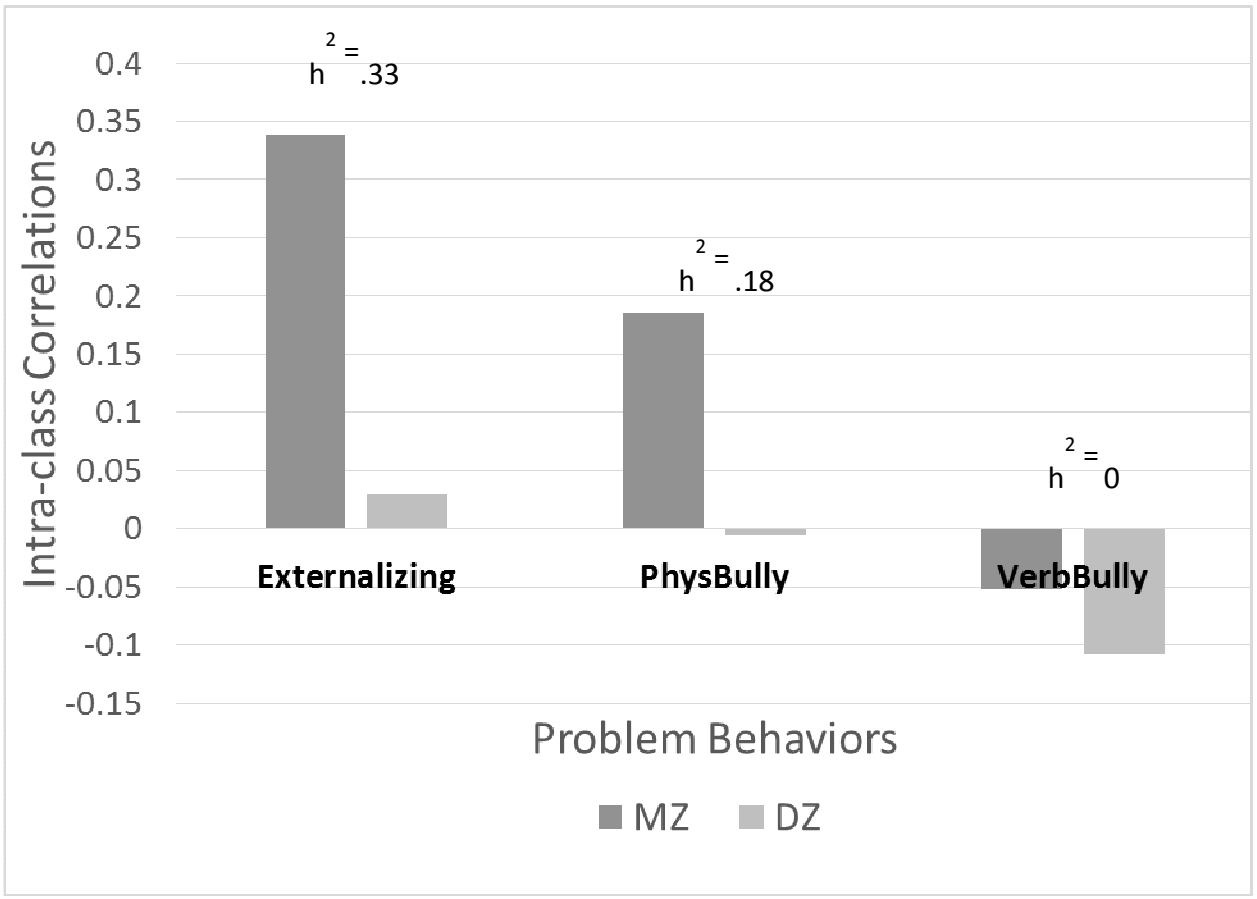
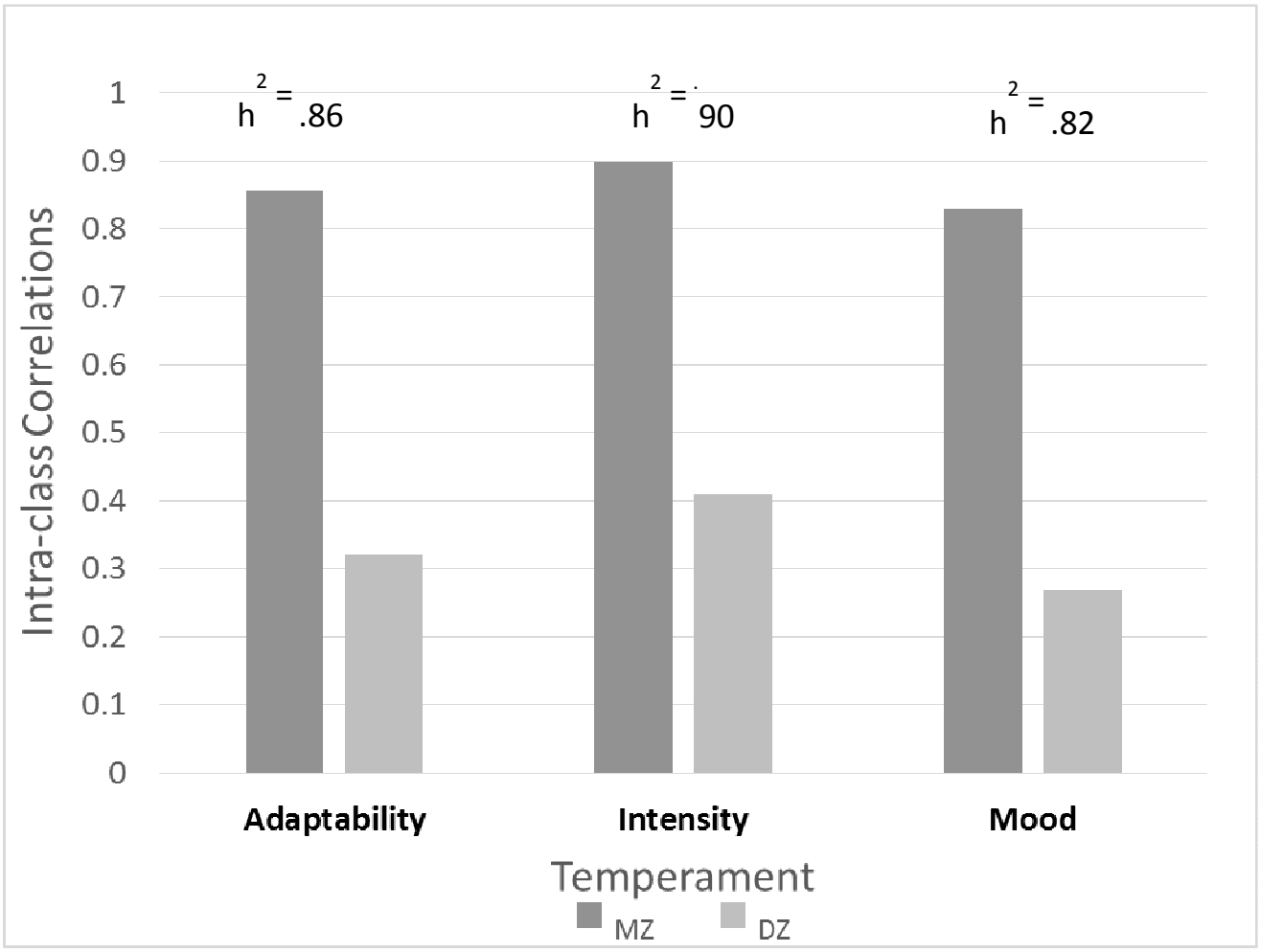


Figure 3

Intra-class Correlations on Temperament



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