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Brooke Darrah March, 20, 2025

Observed and Perceived Parental Criticism Prospectively Predicts Substance Use Problems and Depression in Later Adolescence

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An abstract of
A thesis submitted to the Faculty of Emory College of Arts and Sciences
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Abstract

The objective of the current study was to assess the relationship between objectively measured parental criticism, child perception of parental criticism and later youth outcomes of substance abuse and depression. We also explored congruency between objective and perceived measures of parental criticism and later youth psychopathology. We collected data from 388 family triads, inclusive of mothers, fathers, and adolescent children, from the Mater-University of Queensland Study of Pregnancy (MUSP). We measured child perception of parent criticism at age 15 through the Child Report of Parent Behavior Inventory and objective measures of parent criticism through the Five-Minute Speech Sample (FMSS). At age 20, youth were administered the Beck Depression Inventory (BDI), the Structured Clinical Interview for DSM-IV, and the Michigan Alcohol Screening Test (MAST). Results revealed that perceived parental criticism significantly mediated the relationship between both maternal and paternal objective measures of criticism and youth depression outcomes, but that objective criticism more directly impacted youth substance use outcomes. Exploratory analyses revealed differences in youth outcomes related to incongruence in objective versus perceived parental criticism, suggesting that adolescents who perceived high father criticism despite low objective father criticism and those who did not perceive their objectively critical mothers as such were at risk for later psychopathology. The findings highlight the importance of adolescent perception in shaping mental health trajectories as well as the importance of examining both mothers and fathers in parenting research. **Keywords***: parental criticism, adolescent perception, substance use, depression, longitudinal*

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Table of Contents

Observed and Perceived Parental Criticism Prospectively Predicts Substance Use Problems and Depression in Later Adolescence

Parenting deficits, or impairments in a functional capacity of parenting, have been identified as risk factors for adolescent substance use and depression (Park et al., 2016; Murphy et al., 2015). Depression and substance use are major health concerns for adolescents (Wilson & Dumornay, 2022; Teenage Drug Use Statistics, 2023), and are widespread in society. In 2021, it was estimated that approximately 20% of adolescents aged 12 to 17 in the United States were suffering from depression (U.S Department of Health and Human Services, 2023). Similarly, substance use remains a prevalent issue particularly with the rise of nicotine devices such as vapes and the legalization of marijuana (Uddin et al., 2020). Given the short and long-term negative impacts of adolescent substance use and depression, there is a need to explore modifiable risk factors leading to these outcomes (Marmorstein et al., 2010). Adolescence is a period of increased brain plasticity, pubertal maturation, and behavioral shifts which place individuals at an increased vulnerability to stressors (Sisk and Gee, 2023), but also present an opportunity for positive change and enhanced resilience. This study therefore focuses on parenting during adolescence and its association with later depression, alcohol use, and substance abuse in youth.

The American Psychological Association defines parenting as all actions related to the raising of offspring while effective parenting is characterized as preparing children to meet the demands of their specific culture and social environments (American Psychological Association, 2023; Joseph and John, 2008). Parenting behaviors have multiple determinants including: (1) personal psychological resources of parents, (2) characteristics of the child, and (3) contextual sources of stress and support (Belsky, 1984). These determinants shape parenting styles, which, in turn, significantly impact child development (National Institute of Mental Health, 2018). Effective

parenting has been associated with positive developmental outcomes such as better mental health, emotional regulation, cognitive function, and improvement in somatic functions (Lanjekar, 2022; Sandler, 2015). In contrast, poor parenting can lead to hinderances in the adolescent's development, as well as psychopathology (Murphy et al., 2015).

The present study attempts to examine the role of parental criticism (objectively observed as well as perceived by the child) in predicting later youth substance use and depression. Exploratory analyses also attempt to explore congruence between observed and perceived parental criticism and adolescent psychopathology. Parental criticism is defined as critical or irritable behaviors directed toward the child and is well established as a risk factor for youth mental health problems and negative somatic symptoms (Horwitz et al., 2016; Berla et al., 2022). Criticism or negative feedback is associated with increased activity in the neural saliency network, while positive feedback is associated with increased activity in temporoparietal junction, posterior superior temporal sulcus, and precuneus, all in which are related to social cognition (Houtum et al., 2022). Continued exposure to parental criticism leads to an increase in ruminative thoughts, negative mood states, maladaptive emotional regulation skills, and a decrease in positive mood states, increasing the risk for psychopathology (Bonduelle et al., 2023). Specially, parental criticism is associated with depression symptoms in youth (Peris and Miklowitz, 2015). Additionally, negative feedback is associated with higher cortisol responses and greater likelihood of adolescent substance use (Chaplin et al., 2014).

Child Perception of Parenting. Perceptual development refers to how children start taking in, interpreting, and understanding sensory input (Goodway, Ozmun, and Gallahue, 2021). Parents and children often perceive adolescent behavior differently. For example, in a large study using the Strengths and Difficulties Questionnaire, children were found to report more behavior

problems but less impact of perceived difficulties than parents, while parents were more consistent in their evaluation of symptoms and impact (Van Roy et al., 2010). In addition, parents and children do not always perceive parenting quality in the same way, with mothers tending to report more positive parenting behaviors in comparison to child and partner reports (Bogels and Van Melick, 2004). Reflective appraisal processes are defined as ways in which people's self-views are influenced by their perception of how others view them (Wallace and Tice, 2021). People are influenced by this "social mirror" and respond to their *perceptions* of what other people think, rather than the actual opinions of others (Felson, 1985). In the psychopathology literature, perceptions often have stronger predictive power than objective exposures. For instance, perceived, relative to objective, experiences of childhood adversity are more strongly associated with adolescent psychopathology (Danese and Widom, 2020). Of central relevance to the current study, a child's perception of criticism appears to be a stronger predictor of emotional outcomes, than objective measures of critical behavior (Bonduelle, 2023). Adolescents are particularly vulnerable to the social mirror phenomenon, with neural systems and social spaces placing them at the highest risk (Pfeifer et al., 2009). Although previous research has assessed the role of parent criticism and perceived parent criticism in predicting child outcomes, no one has tested the stepwise risk process by which objective measures of parent criticism might predict child perceptions of parent criticism, which in turn increases the risk for adolescent psychopathology. In the current study, we fill this research gap by testing whether adolescent perceptions of parent criticism mediate the relationship between objective parental criticism and later substance abuse and depression outcomes.

Congruence of perception and objective measures. Incongruence between family members is defined as the existence of multiple subjective realities in family relations (Conway, 2011).

Disparities between children and parents reports of parenting are the rule rather than the exception (Korelitz and Garber, 2016), with higher discrepancies in adolescent- parent perceptions being associated with higher levels of mother reported conflict (Miller and Drotar, 2003). Additionally, youth who perceive parental criticism as accurate are less likely to engage in negative behaviors such as rumination (Xing et al., 2024). Previous research indicates that discrepancies of parenting reports may be associated with concurrent depressive symptoms in early adolescence (Nelemans et. al, 2016). These findings highlight the potential importance of disagreement between the parent and child in predicting youth outcomes. No study to date has examined the congruence between objective measures of parental criticism and perceived parental criticism as it predicts later youth psychopathology. The current study aims to fill this gap in the literature.

Substance use and depression in adolescence are on the rise and have long term negative impacts on health, emotion, and cognition (Marmorstein et al., 2010). There is a need for longitudinal research into the etiology of these adolescent disorders, and particularly into the modifiable risk factors for these conditions. Current research supports the association between parenting factors and child well-being, such as cognitive, social, and behavioral outcomes (West et al., 2013; Rispoli et al., 2013). However, parent and child congruence in perspective of the dyadic relationship remains under-researched as a potential risk factor for psychopathology and longitudinal studies of the influence of objective versus perceived parental criticism on adolescent psychopathology are lacking. The results of the current study may therefore yield new insights into targets for parent-child interventions to reduce risk for later substance use and depression. Importantly, the current study also emphasizes the importance of examining parenting differences across mothers and fathers in the prediction of adolescent development. Longitudinal research indicates that father involvement acts as a protective factor of behavioral problems, better social

and relational functioning, and better educational outcomes (Sarkadi et al., 2008). Even though research provides support of father's influence on child development, much of research fails to include both mothers and fathers in the conversation of child and adolescent development.

Parental criticism plays a significant role in youth psychological and somatic symptoms and outcomes (Horwitz et al., 2015; Harris and Howard, 1984). Specifically, parental criticism has been linked to long-term adolescent symptoms of depression with higher presence of parental criticism associated with increase severity of symptoms (Rapp et al., 2021). Additionally, previous research suggests that discrepancies in child versus parent views of their negative interactions is associated with higher child depression scores (Nelemans et al., 2013). Parental criticism has also been linked to substance abuse risks in adolescents (Escamilla et al., 2024). However, to the researcher's knowledge no studies have been conducted regarding adolescents' perception of parental criticism as a mediator between objective criticism and youth psychopathology. Furthermore, child development research primarily focuses on the mother's impact on child outcomes despite current research indicating the importance of examining both fathers and mothers, including a recent study on congruence of parental monitoring and adolescent antisocial behavior that noted different associations for fathers versus mothers (Pouliot and Poulin, 2020). The current study aimed to address unanswered questions in the literature regarding objective versus perceived parental criticism. It focused on a prospective analysis of youth outcomes of substance abuse, alcohol use, and depression, offering a novel understanding of parenting risk factors that might be addressed with appropriate intervention. Both mothers' and fathers' parenting characteristics are included to better assess unique relationships across parents. Hypotheses are as follows:

1. We hypothesized that perceived maternal criticism would mediate the relationship between objective measures of maternal criticism and depression outcomes at age 20, such that higher objective levels of criticism will predict higher levels of perceived criticism, which will in turn be associated with higher rates of youth depressive symptoms and depression diagnoses.
2. We hypothesized that perceived maternal criticism will mediate the relationship between objective measures of maternal criticism and substance abuse outcomes at age 20, such that higher objective levels of criticism will predict higher levels of perceived criticism, which will in turn be associated with higher rates of youth alcohol problems and substance abuse diagnoses.
3. We hypothesized that perceived paternal criticism will mediate the relationship between objective measures of paternal criticism and depression outcomes at age 20, such that higher objective levels of criticism will predict higher levels of perceived criticism, which will in turn be associated with higher rates of youth depressive symptoms and depression diagnoses.
4. We hypothesized that perceived paternal criticism will mediate the relationship between objective measures of paternal criticism and substance abuse outcomes at age 20, such that higher objective levels of criticism will predict higher levels of perceived criticism, which will in turn be associated with higher rates of youth alcohol problems and substance abuse diagnoses.
5. Additional analyses explored whether specific types of congruence between objective measures of parent criticism and perceived parent criticism predict later youth substance abuse and depression outcomes. For these analyses congruence was parsed

into four groups for mothers and fathers separately as follows: (1) parent objectively not critical, child does not perceive criticism (2) parent objectively. critical, child does not perceive criticism (3) parent not objectively critical, child perceives criticism, and (4) parent objectively critical, child perceives criticism.

Methods

Participants

Participants in the study consisted of family triads: mother, father, and child, who were initially recruited into the Mater-University of Queensland Study of Pregnancy (MUSP). MUSP is a birth cohort study of 7,223 mothers and their offspring born between 1981 and 1984 at the Mater Misericordiae Mother's Hospital in Brisbane, Australia. The original study focused on children's physical, cognitive, and psychological health from the prenatal period to child age of 14 years. Mothers in the original birth cohort were asked to complete interviews and questionnaires about themselves and their child at five different times: during pregnancy, 3 to 4 days after the birth of their child, 6 months, 5 years, and when the child was 14. Additional timepoints of youth ages 15, 20 and 22 years were added for a subset of 816 participants recruited on the basis of (1) continued residency in Brisbane and (2) variations in maternal self-reports of depressive symptoms from pregnancy to child age 5, oversampling for high risk for depression. At the age 15 follow up, biological fathers who lived in the area were invited to participate, as were stepfathers who had lived with the child for 5 years or greater. Participants in the age 15 and later follow ups did not differ significantly from the initial cohort in terms of family income, ethnicity, and parent education. The study was approved by the IRBs at The University of Queensland, The University of California Los Angeles, and Emory University.

Analytic Sample for Current Study

Family triads were included in the current study only if both the mother and father agreed to participate in the age 15 follow up, and if the youth participated in the age 20 follow-up. Families were selected if all parties completed the necessary measures regarding criticism at age 15. Of these 388 families, 46 adolescents were excluded for failure to complete the outcome measures at age 20 checkpoint n= 342. The median income level of the selected sample did not differ significantly from the original birth cohort, as the majority of families were middle-income to low-income.

Procedure

Both parents completed the Five-Minute Speech Sample (FMSS) at the age 15 timepoint. Adolescents at age 15 also completed the Child Report of Parent Behavior Inventory (CRPBI). At the following assessment point at age 20, adolescents were administered the Beck Depression Inventory (BDI), Structured Clinical Interview for DSM-IV Substance Abuse, and Michigan Alcohol Screening Test (MAST). Adults gave written informed consent, minors gave assent, and all participants were compensated for their time with modest cash stipends.

Measures

Adolescent Perception of Parent Criticism. At the age 15 follow-up, adolescents' perception of both of their parents' behavior was assessed using the Child Report of Parent Behavior Inventory (CRPBI; E. S. Schaefer, 1970). This measure evaluates the perception of parent behavior in three dimensions. Researchers created scales for examining the dimensions: acceptance vs. rejection (e.g., "makes me feel better after talking over my worries with her/him"), psychological control vs. psychological autonomy (e.g., "tells me of all the things she has done for me" and firm vs lax control (e.g., "believes in a lot of rules and sticking with

them"). The current study utilized the acceptance/rejection scale, reverse coded so that higher scores represented more rejection or criticism. The Alpha reliability for the subscales was high: maternal rejection (alpha= .90), paternal rejection (alpha=.93).

Objective Measure of Parental Criticism. Parents' expressed emotion was assessed with the Five-Minute Speech Sample (FMSS; Magana et al., 1986). Parental attitudes toward the child were measured as high or low expressed emotion (EE) in the two dimensions of criticism and emotional overinvolvement. The in-home interview asks each parent to sit in front of an audiotape recorder and speak unprompted and uninterrupted about their child. Each parent completes this interview separately, away from the child. This interview was completed when the adolescent was 15 years old. Coders for the current study's FMSS were trained by the group of researchers that developed and validated by Magana et al. (1986) and coders were blind to all information about the family triad. Inter reliability validity is good for EE criticism (kappas with ranges from .63 to .82).

Objective and Perceived Criticism Congruence. The current study utilizes an exploratory variable of parental criticism congruence. This variable is a composite score created from the adolescent perception measure, CRPBI rejection, and the objective parental criticism measure, FMSS criticism. A Pearson correlation was conducted between the adolescent perception measure and the perceptions of both the father and mother. Adolescent perception of the mother's criticism was correlated with objective maternal criticism of the child, $r(388)= .176$, $p < .001$. However, the correlation was low, suggesting that not all adolescent and mother measures were congruent. Similarly, the adolescent perception of the father's criticism was correlated with objective father criticism, $r(388)= .203$, $p < .001$ but again the correlation was low, indicating varying levels of congruence for participants in the sample. To assess congruence

of objective and perceived criticism, we created four groups for each parent (mother and father) as follows: (1) parent not critical, child not feeling criticized, (2) parent critical, child not feeling criticized (3) parent critical, child feeling criticized, and (4) parent critical, child feeling criticized. To clarify for group 1: FMSS and CRPBI both have low scores of criticism, group 2: FMSS has a high score of criticism while CRPBI has a low score of criticism, group 3: FMSS has a low score of criticism while CRPBI has a high score of criticism, and group 4: both FMSS and CRPBI have a high score of criticism.

Mother-child congruence groups are distributed as follows: (1) mother not critical, child not feeling criticized (n=161, 41.5%) (2) mother critical, child not feeling criticized (n=51, 13.1%) (3) mother not critical, child feeling criticized (n= 113, 29.1%) (4) mother critical, child feeling criticized (n= 63, 16.2%) (See Figure 1).

Figure 1

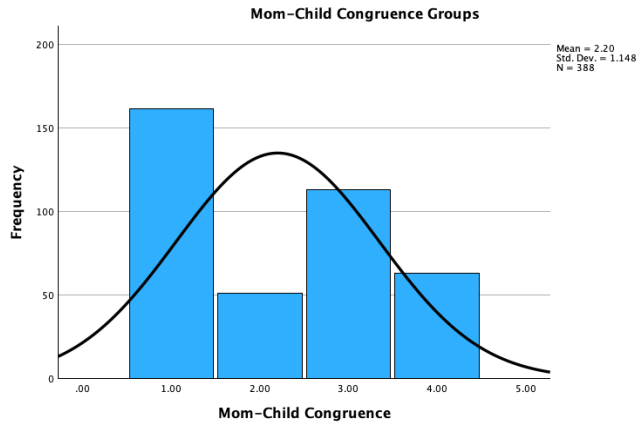


Figure 1. Histogram of the frequencies of the mother-child congruence groups.

Father-child congruence groups are distributed as so: (1) father not critical, child not feeling criticized (n=151, 41%) (2) father critical, child not feeling criticized (n=25, 6.4%) (3)

father not critical, child feeling criticized (n= 151, 38.9%) (4) father critical, child feeling criticized (n= 53, 13.7%) (See Figure 2).

Figure 2.

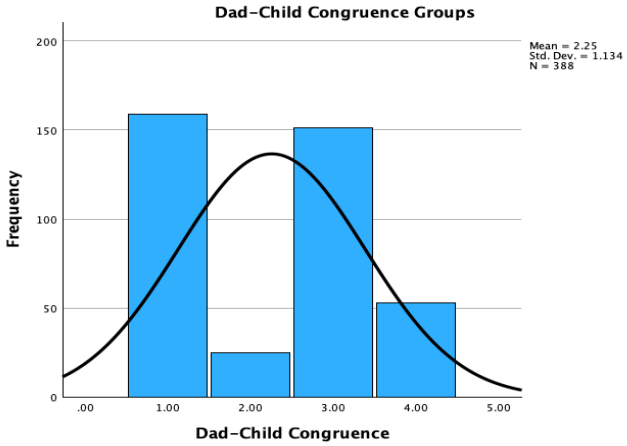


Figure 2. Histogram of the frequencies of the father-child congruence groups.

Adolescent Substance Abuse. Adolescent substance abuse disorder at age 20 was measured with the Structured Clinical Interview for DSM-IV (SCID; First et al., 1995). The SCID is a semi-structured interview that follows the DSM-4 diagnostic procedure. It has open-ended questions that introduce a content area for instance, *"Have you ever had"*, followed by a set of scripted questions standard to SCID. All diagnostic decisions were made by a clinical research team. The kappas showed a .79, which is good reliability for current substance use disorders.

Adolescent Alcohol Use. The adolescent's alcohol use was measured at age 20 using the Michigan Alcohol Screening Test (MAST; Selzer 1971), which is a gold standard measure used to assess alcohol and drug use. It is a 25-item questionnaire that utilizes a two-point scale of *"yes"* or *"no"*. We summed the score with 1 point given for every yes answered and 0 points for every no. In the current sample the MAST was adequately reliable with a Cronbach Alpha score

of .67. It should be noted that the MAST was completed at age 20, where the common age range of clinician application is age 18 and onward. By filling out at age 20, participants have limited time for the social and occupational hazards to accumulate, which may be limiting the Cronbach Alpha score.

Adolescent Depression Symptoms. Adolescent depressive symptoms were measured by the Beck Depression Inventory (BDI; Beck et at., 1961) at age 20. The BDI is a 21-item, self-report questionnaire, with depressive symptom items scaled from 0-3. The total scale ranges in the intensity of depressive feelings with 0 being the lowest presence of depressive symptoms and higher total scores indicative of more severe depressive symptoms. In this sample internal consistency was considered excellent for reliability with a Cronbach's alpha of .92.

Adolescent Depression Diagnosis. Adolescents were classified as having a depression diagnosis if they met the criteria for a lifetime diagnosis of major depression or dysthymia on the Structured Clinical Interview for DSM Disorders (SCID; First et al., 1995). The SCID is a semi-structured interview that follows the DSM-4 diagnostic procedure. It has open-ended questions that introduce a content area for instance, *"Have you ever had"*, followed by a set of scripted questions standard to SCID. All diagnostic decisions were made by the clinical research team. The kappas showed a .89, which is strong reliability for current major depression diagnosis.

Potential Confounds. Potential confounds were identified and examined in preliminary analyses. They were identified as child sex, mother depression diagnosis history (yes or no through child age 15), parent education, and ethnicity. These confounding variables were included as covariates in the data analysis.

Results

Data Analysis

All statistical models were run in IBM SPSS version 29.0, with mediation models computed via PROCESS Macro Version 3.5.3 (Model 4; Andrew Hayes, 2020; Hayes & Montoya, 2017; IBM Corp, 2022). For our primary hypotheses, we examined the mediating influence of child perception of parental criticism on the relationship between objective parental criticism and later youth outcomes. More specifically, we estimated the direct effect from parental criticism to child perception of parental criticism, the direct effect from child perception of parental criticism to later youth outcomes, and the indirect effect from parental criticism to later youth outcomes through child perception of parental criticism. We also report direct effects between objective parental criticism and later youth substance abuse and depression. For our exploratory analyses of congruence groups, we used General Linear Models with the congruent no criticism group as the reference group. A priori selected potential confounds were included as covariates in all analyses and included: child sex, mother depression history, parent education, and ethnicity. Statistical significance was fixed at a two-sided p-value of <.05.

Demographics

Demographic information and descriptive for primary variables are presented in **Table 1**. Prior to performing hypothesis testing, correlations were run between predictor and outcome variables to assess their unadjusted relationships.

Table 1.
Demographic Information

Measure	*M*	*SD*	*N*	Percentage
Gender				
Male			184	46.6%
Female			207	53.4%
Ethnicity				
Minority			34	8.8%
Non-minority			354	91.2%
Parent Measurements				
Mother FMSS	0.2938	0.4561		
Father FMSS	0.2010	0.4013		
Adolescent Measurements				
Youth-mother CRPBI	0.4536	0.4985		
Youth-father CRPBI	0.5258	0.5000		
Later Youth Outcomes				
BDI	6.3207	7.7680	343	
MAST	26.0088	2.2097	342	
SCID-Depression			388	15.7%
SCID-Substance Abuse			388	10.6%

Table 2.

Bivariate Correlations.

Variable	CRPBI Mother-kid	FMSS Father	CRPBI Father-Kid	BDI	SCID Depression Diagnosis	MAST	SCID Substance Abuse
FMSS Mother	0.128*	0.213**	0.125*	0.104	0.110*	0.134*	0.063
CRPBI Mother-kid		0.085	0.357**	0.115*	0.040	0.070	0.090
FMSS Father			0.154**	0.084	0.079	0.171**	0.101*
CRPBI Father-Kid				0.124*	0.125*	0.052	0.013*
BDI					0.432**	0.212**	0.080
SCID Depression Diagnosis						0.120*	0.036
MAST							0.327**

Table 2. Table 2 presents the bivariate correlations among the study variables**.** As can be seen the parent criticism variables were significantly associated with youth substance abuse and depression outcomes, but with different patterns noted for objective versus perceived criticism and mother versus father measures.

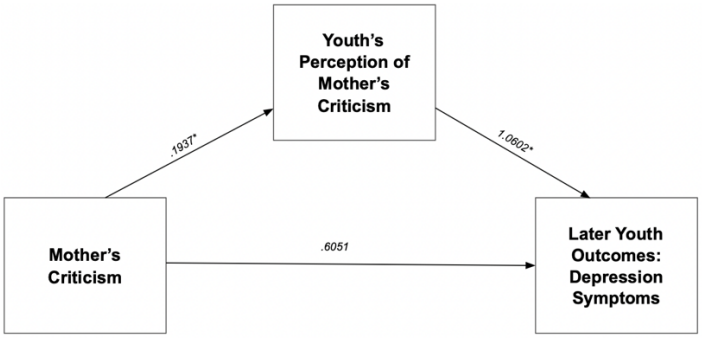
Primary analysis

Mediation Effects of Child Perception on Parental Criticism and Later Youth Outcomes

We hypothesized that perceived maternal criticism would mediate the relationship between objective measures of maternal criticism and depression outcomes at age 20, such that

higher objective levels of criticism would predict higher levels of perceived criticism, which would in turn be associated with higher rates of youth depressive symptoms and depression diagnoses. Our first mediation model demonstrated a significant indirect effect of mother's criticism on depression symptoms through youth's perception of mother's criticism as indicated by bootstrap estimated 95% confidence intervals (standardized effect = .2054; see Figure 3). The direct effect between mother's criticism and depression symptoms was not significant.

Figure 3.



*p<.05

Figure 3. Diagram of mediation model with direct paths from mother's criticism to youth's perception of mother's criticism **(a)** and youth's perception of mother's criticism to later youth outcomes: depression symptoms **(b)** as well as a direct pathway from mother's criticism to later youth outcomes: depressive symptoms **(c')**. 95% confidence intervals of the indirect effect based on bootstrap estimates were 0.0178 to .4784.

Our second mediation model demonstrated a non-significant indirect effect of mother's criticism on depression diagnosis through youth's perception of mother's criticism as indicated by bootstrap estimated 95% confidence intervals (standardized effect = .0339; see Figure 4). The direct effect between mother's criticism and depression symptoms was, however, significant.

Figure 4.

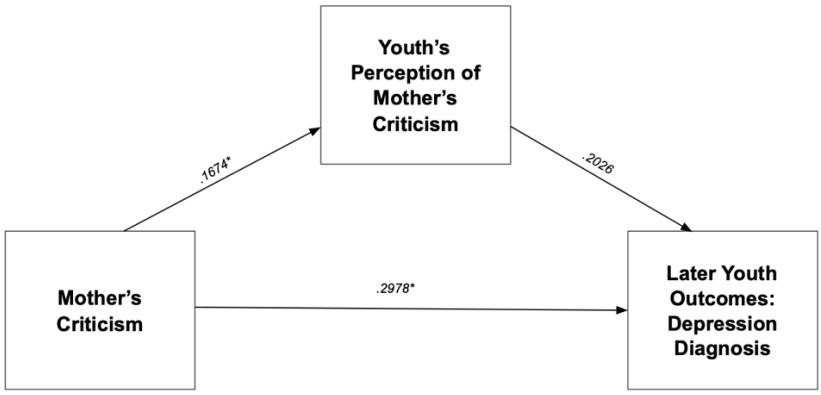


Figure 4. Diagram of mediation model with direct paths from mother's criticism to youth's perception of mother's criticism **(a)** and youth's perception of mother's criticism to later youth outcomes: depression diagnosis **(b)** as well as a direct pathway from mother's criticism to later youth outcomes: depressive diagnosis (**c'**). 95% confidence intervals of the indirect effect based on bootstrap estimates were -0.0171 to 0.1007.

Next, we hypothesized that perceived maternal criticism would mediate the relationship between objective measures of maternal criticism and substance use outcomes at age 20, such that higher objective levels of criticism would predict higher levels of perceived criticism, which would in turn be associated with higher rates of youth alcohol problems and substance abuse diagnoses. Contrary to our hypothesis, our third mediation model demonstrated a non-significant indirect effect of mother's criticism on youth alcohol problems through youth's perception of mother's criticism as indicated by bootstrap estimated 95% confidence intervals (standardized effect = 0.0186; see Figure 5). The direct effect between mother's criticism and alcohol use was, however, significant.

Figure 5.

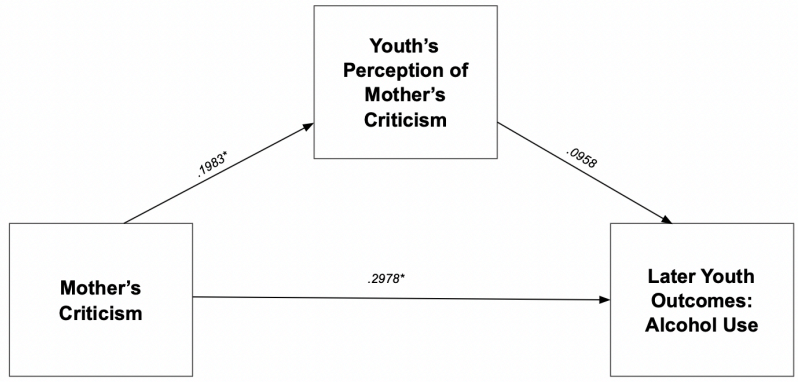


Figure 5. Diagram of mediation model with direct paths from mother's criticism to youth's perception of mother's criticism **(a)** and youth's perception of mother's criticism to later youth outcomes: alcohol use **(b)** as well as a direct pathway from mother's criticism to later youth outcomes: alcohol use (**c'**). 95% confidence intervals of the indirect effect based on bootstrap estimates were -0.0350 to 0.0878.

Our fourth mediation model also demonstrated a non-significant indirect effect of mother's criticism on youth's substance abuse through youth's perception of mother's criticism as indicated by bootstrap estimated 95% confidence intervals (standardized effect= 0.0127; see Figure 6). The direct effect between mother's criticism and youth's substance abuse was also non-significant.

Figure 6.

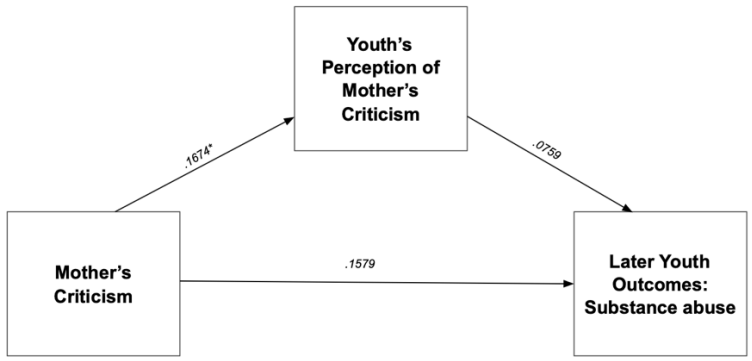


Figure 6. Diagram of mediation model with direct paths from mother's criticism to youth's perception of mother's criticism **(a)** and youth's perception of mother's criticism to later youth outcomes: substance abuse **(b)** as well as a direct pathway from mother's criticism to later youth outcomes: substance abuse (**c'**). 95% confidence intervals of the indirect effect based on bootstrap estimates were -0.0443 to 0.0675.

We also hypothesized that perceived paternal criticism would mediate the relationship between objective measures of paternal criticism and depression outcomes at age 20, such that higher objective levels of criticism would predict higher levels of perceived criticism, which would in turn be associated with higher rates of youth depressive symptoms and depression diagnoses.

In line with our hypothesis, our fifth mediation model demonstrated a significant indirect effect of father's criticism on depression symptoms through youth's perception of father's criticism as indicated by bootstrap estimated 95% confidence intervals (standardized effect = .1993; see Figure 7). Specifically, father's criticism was positively associated with youth's perception of father's criticism and youth's perception of father's criticism was positively associated with depression symptoms. The direct effect between father's criticism and depression symptoms was not significant.

Figure 7.

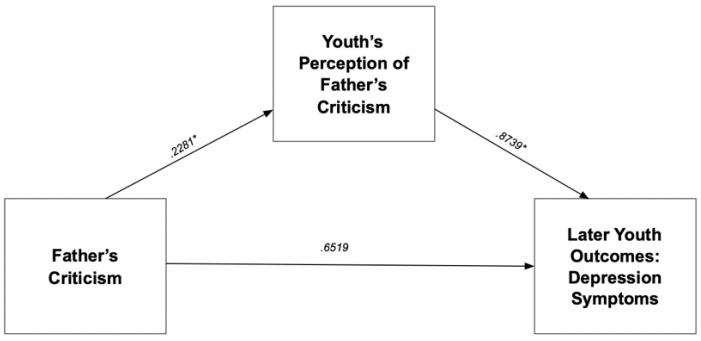


Figure 7. Diagram of mediation model with direct paths from father's criticism to youth's perception of father's criticism **(a)** and youth's perception of father's criticism to later youth outcomes: depression symptoms **(b)** as well as a direct pathway from father's criticism to later youth outcomes: depressive symptoms **(c')**. 95% confidence intervals of the indirect effect based on bootstrap estimates were 0.0194 to 0.04137.

Our sixth mediation model also demonstrated a significant indirect effect of father's criticism on depression diagnosis through youth's perception of father's criticism as indicated by bootstrap estimated 95% confidence intervals (standardized effect = 0.0711; see Figure 8). Specifically, father's criticism was positively associated with youth's perception of father's criticism and youth's perception of father's criticism was positively associated with depression diagnosis. The direct effect between father's criticism and depression diagnosis was not significant.

Figure 8.

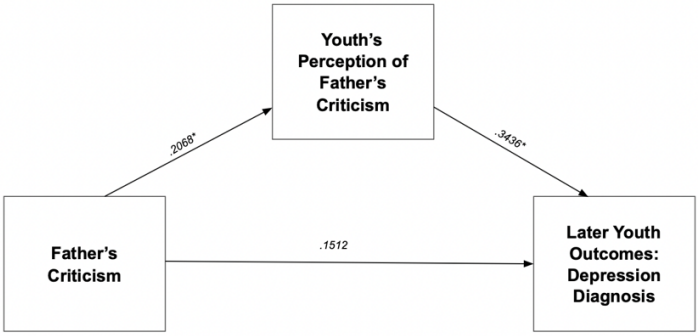


Figure 8. Diagram of mediation model with direct paths from father's criticism to youth's perception of father's criticism **(a)** and youth's perception of father's criticism to later youth outcomes: depression diagnosis **(b)** as well as a direct pathway from father's criticism to later youth outcomes: depressive diagnosis **(c')**. 95% confidence intervals of the indirect effect based on bootstrap estimates were 0.0084 to 0.1575.

We also hypothesized that perceived paternal criticism would mediate the relationship between objective measures of paternal criticism and substance use outcomes at age 20, such that higher objective levels of criticism would predict higher levels of perceived criticism, which would in turn be associated with higher rates of youth alcohol problems and substance use diagnoses.

Contrary to our hypothesis, our seventh mediation model demonstrated a non- significant indirect effect of father's criticism on alcohol use through youth's perception of father's criticism as indicated by bootstrap estimated 95% confidence intervals (standardized effect = .0185; see Figure 9). The direct effect between father's criticism and alcohol use was, however, significant.

Figure 9.

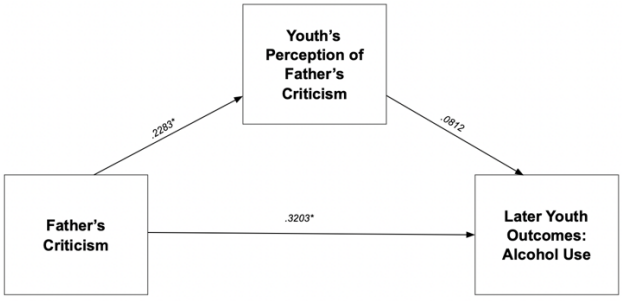


Figure 9. Diagram of mediation model with direct paths from father's criticism to youth's perception of father's criticism **(a)** and youth's perception of father's criticism to later youth outcomes: alcohol use **(b)** as well as a direct pathway from father's criticism to later youth outcomes: alcohol use **(c')**. 95% confidence intervals of the indirect effect based on bootstrap estimates were -0.0294 to 0.0715.

Again, contrary to our hypothesis, our final mediation model demonstrated a non-significant indirect effect of father's criticism on substance use through youth's perception of father's criticism as indicated by bootstrap estimated 95% confidence intervals (standardized

effect = 0.0233; see Figure 10). The direct effect between father's criticism and substance abuse was also not significant.

Figure 10.

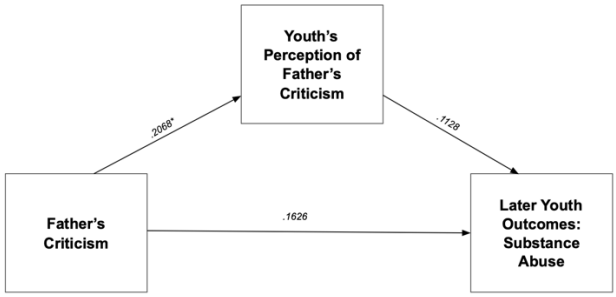


Figure 10.

Diagram of mediation model with direct paths from father's criticism to youth's perception of father's criticism **(a)** and youth's perception of father's criticism to later youth outcomes: substance abuse **(b)** as well as a direct pathway from father's criticism to later youth outcomes: substance abuse **(c')**. 95% confidence intervals of the indirect effect based on bootstrap estimates were -0.0294 to 0.0715.

Figure 11.

Parent	Outcome	Direct Effect	Indirect Effect
Mother	Depression Symptoms	×	✓
	Depression Diagnosis	✓	×
	Alcohol Use	✓	×
	Substance Abuse	×	×
Father	Depression Symptoms	×	✓
	Depression Diagnosis	×	✓
	Alcohol Use	✓	×
	Substance Abuse	×	×

Figure 11.

Figure summarizing significant findings in the mother and father column within outcomes: depression symptoms, depression diagnosis, alcohol use, and substance abuse diagnosis for both the direct and indirect effect.

Exploratory Analysis.

Types of congruence on parental criticism predicting later youth outcomes.

Finally, we explored whether specific patterns of congruence between objective measures of parent criticism and perceived parent criticism predicted later youth substance use and depression outcomes. For these analyses, congruence was parsed into four groups for mothers and fathers separately as follows: (1) parent objectively not critical, child does not perceive criticism (2) parent objectively. critical, child does not perceive criticism (3) parent not objectively critical, child perceives criticism, and (4) parent objectively critical, child perceives criticism.

A planned contrast was conducted to compare whether the other congruence groups significantly differed from the group where both objective and perceived measures indicated low levels of criticism on later youth substance abuse and depression outcomes. Significant group differences are reported below.

The most consistent finding in our exploratory analyses was a significant difference in youth outcomes for the group that was congruent for high criticism versus the group that was congruent for low criticism. This contrast was significant for father congruence predicting MAST alcohol use (p <0.001), depression diagnoses (p =0.006), and BDI symptoms of depression (p = 0.002), as well as mother congruence predicting youth BDI symptoms (p = 0.008). In all cases, the group that was congruent for high criticism showed worse youth outcomes than the group that was congruent for low criticism, which would be expected. It is

also notable that this pattern was more consistent across youth outcomes in the case of father criticism versus mother criticism.

Our findings regarding incongruence in parent criticism were also different for mothers versus fathers in the sample. For mothers, the comparison of congruent low criticism versus incongruent high objective criticism/low child perceived criticism was significantly associated with both youth MAST scores (p =.017) and youth depression diagnoses (p =0.002). In both cases the incongruent group had higher psychopathology. For fathers' criticism, the incongruent low objective criticism, high child perceived criticism group was significantly more likely than the congruent low criticism group to have a diagnosis of depression at age 20 (p = 0.029).

Figure 12.

Congruence Group	Depression Symptoms	Depression Diagnosis	Alcohol Use	Substance Abuse
Both mother and kid *not critical* vs. Both mother and kid *critical*	✓	×	×	×
Both mother and kid *not critical* vs. Mother *critical* and kid *not critical*	×	✓	✓	×
Both mother and kid *not critical* vs. Mother *not critical* and kid *critical*	×	×	×	×
Both father and kid *not critical* vs. Both father and kid *critical*	✓	✓	✓	×
Both father and kid *not critical* vs. Father *critical* and kid *not critical*	×	✓	×	×
Both father and kid *not critical* vs. Father *not critical* and kid *critical*	×	✓	×	×

Figure 12.

Figure summarizing findings in the mother and father- kid congruence groups column within outcomes: depression symptoms, depression diagnosis, alcohol use, and substance abuse diagnosis.

Discussion

The present study aimed to examine the relationship between objective measures of parental criticism, perceived parental criticism, and later youth outcomes of depression and substance use. Our findings indicate the importance of adolescent perceptions of parental behavior, and particularly that youth perception can serve as a mediator in the association between objective parent behavior and long-term well-being in youth. Notably, perceived maternal and paternal criticism was significant in mediating the association between objective measures of criticism and youth depression outcomes. Perceived criticism was not a mediator in the cases of substance abuse and alcohol use, however, there was a direct effect of objectively measured parental criticism on alcohol use. These results provide new insights into the mechanisms of influencing youth mental health and adverse outcomes, particularly emphasizing the importance of assessing how adolescents interpret and internalize their parents' behavior rather than merely assessing objective measures of parents' behavior.

A distinct, novel contribution of this study was the further exploration of parent-child perception through the concept "congruence". Our findings suggest that discrepancies between objective parental criticism and adolescent perceptions of criticism may be an important risk factor for later depression problems, however, the type of dissonance, or as addressed in the current study, congruence may allow for further insights. For instance, a particular group of interest was youth who perceived their parents as critical despite low objective measures of parental criticism. Surprisingly, an additional group of youth that did not perceive criticism even though objective levels of criticism were high, faced even greater risks for psychopathology. This may point to poor social functioning or the inability to register social cues as a risk factor for mental health problems. (Boykin and Allen, 2003; Carr and Schellenbach, 1993). Such issues have previously been linked to behavioral and mental health outcomes such as depressive

problems (Verboom et al., 2014). One potential explanation for the inconsistent findings regarding substance use in this study is that parents may not be the most influential factor in adolescence, particularly when it comes to decisions regarding alcohol and drug use. As adolescents enter their later teenage years, their time spent with parents decreases, while their time spent with peers increases (Lam et al., 2015). Adolescents' decision-making processes are also deeply intertwined with social and emotional influences (Albert et al., 2013; Plous, 1993). Value-based decision- making is heavily shaped by peers, in whose presence adolescents are more likely to engage in risk taking behaviors such as substance use (Blakemore and Robbins, 2012). Risky behaviors and poor decision making have been linked to peer pressure (Albert et at., 2014). Given that substance use often occurs social settings it is possible that the impact of peer influence may obscure children's concerns about parental criticism. Future research should investigate the interactive effects of parental criticism and peer influence to provide clarification and provide greater understanding of the risk processes for substance use.

Another potential influence that needs further exploration is social isolation. Social isolation is defined as a lack of social contact or support, while loneliness is the feeling of being alone or isolated (National Institute of Health, 2014). Perhaps, social isolation could contribute to an adolescents' obliviousness to parental criticism. Children whose parents are more objectively critical may be less engaged in family interactions, for instance, making them more vulnerable to misinterpretation or lack of registering social cues (Cacioppo and Cacioppo, 2014). Low social connection or loneliness is associated with interpersonal behaviors that lead to psychological distress and low self-esteem (Lee et al., 2001). Simply put, adolescents who lack social connections are more vulnerable to mental health challenges, and therefore are at a higher risk for problematic substance use.

Implications.

This study underscores the importance of family interventions that address both parenting behaviors and adolescents' interpretations of those behaviors. Traditional family intervention often focuses on parent behavior modification; however, the current study suggests the consideration of youth perceptions as an additional focus of intervention. Family based interventions may shift approaches to focus on assisting adolescents to reframe critical parent feedback as a more constructive device. This could potentially serve as a protective factor against internalized symptoms such as depression.

Strengths.

The following study has numerous strengths. By following participants over five years during a critical developmental period, it provides important insights about how early family dynamics contribute to long term health trajectories. Furthermore, by utilizing a multimethod approach of measuring criticism through both objective and subjective measures, this study allows for a more nuanced analysis of the role of parental criticism in influencing later youth psychopathology. Additionally, the inclusion of both maternal and paternal data was a study strength. Fathers remain understudied in their role in shaping adolescents' emotional development (Schulz et al., 2023). Our results, particularly those regarding incongruence of objective and perceived criticism suggest that the risk processes may be unique for fathers versus mothers, and that further research on fathers would be beneficial in informing family interventions.

Weaknesses and future directions.

Several limitations of the current study must be acknowledged, and in turn provide a framework and guidance for future research. The demographics of our study sample, with

participants predominantly coming from a non-ethnic and middle-income backgrounds, limits the generalizability of our results to more diverse populations. Furthermore, the study was conducted in a western country, also limiting the application of parental criticism to one cultural context. Adolescents' perception of parent behavior should be explored in more diverse cultural contexts. Additionally, while our study did span five years, measurements were limited to two check-ins one at age 15 and another age 20. Outcomes later in adulthood may shift, and parental influences may decrease at that time. There is also the concern regarding temporal order in that our mediation models regarding parental criticism and perceived parental criticism relied on measures collected at age 15. To address this concern, future research should attempt to examine the dynamic processes that unfold across parenting and children's perceptions over time. Finally, we did not control for previous depression or substance use in adolescents when measuring outcomes at age 20, leaving open the question of bidirectional influence of children's problematic behaviors and parental criticism. Future longitudinal studies are needed to better assess how these associations unfold across childhood and adolescence.

Conclusion

The current study advances our understanding about how parental criticism relates to later youth mental health outcomes. Findings suggest that objective parental criticism directly influences substance use outcomes, whereas parental criticism's effect on youth depression outcomes may occur through youth perception of parental criticism. Additionally, maternal and paternal criticism might influence youth psychopathology through different processes. Ultimately, this study contributes to the growing body of evidence supporting the need for family centered approaches to adolescents' mental health and intervention, with the ultimate goal of reducing adolescent depression and substance use.

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