Woodcock Institute: Final Report

Executive Functioning in Adolescent Pathological Liars: Examining Prevalence and Etiology

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A final detailed written report, including the use of the funds, must be submitted to the Woodcock Institute within 60 days of the completion of the grant.

The current project, titled Executive Functioning in Adolescent Pathological Liars: Examining Prevalence and Etiology, was designed to investigate the pathological lying profile among an adolescent sample and the role of executive functioning and psychopathology.

Summary of Activities Completed and/or Goals Met

All activities outlined in the Woodcock Institute grant proposal have been completed and the project has maintained the proposed timeline. This project was approved by the IRB on January 19, 2023 by the Angelo State University IRB. Assessment materials and participant payment incentives (via Prolific) were purchased. The participant payment portal was paid and monies available at the end of March, 2023. Shortly afterward, we launched the study and collected data. Data was collected throughout April and May and completed at the end of May, 2023. The PI and co-PIs worked throughout the summer on entering, cleaning, coding, organizing, and analyzing the data. After conducting statistical analyses, the results have been written into a synthesized manuscript. The full manuscript is still being written and edited. The findings of the pathological lying sample was accepted and presented on December 8, 2023, at Decepticon 2023 (attached). Decepticon is the annual conference held by the Deception Research Society, which is a group of deception expert researchers from various disciplines across the world (see https://deceptionresearchsociety.org/). The presentation will be published on the Youtube channel here: https://www.youtube.com/channel/UCfx4XicT7M4UgoX17MCBbtA. Findings from the larger data set have been submitted for presentation at the 2024 Southwestern Psychological

Association conference. Finally, the manuscript will be submitted to either *Journal of Clinical Child & Adolescent Psychology, Research on Child and Adolescent Psychopathology, Psychological Assessment, Evidence-Based Practice in Child and Adolescent Mental Health,* or *Psychiatric Research and Clinical Practice.*

Budget

The overall budget for this project amounts to $15,000. We have expensed all of the funds, $15,000. All materials have been expensed (e.g., DISC; D-REF) and all participants have been paid. There was an increase in cost from the initial quote from Pearson for the D-REF assessments ($100 more). However, the McGill Faculty contract was not be expensed, due to the faculty choosing to re-allocate funds for the project and university policies on contract for hire work. Thus, we reallocated funds to cover the extra cost ($100) from Pearson funds for the PI's work on the project. The budget form is attached to include a year-to-date summary of items expensed.

Executive Functioning in Adolescent Pathological Liars: Examining Prevalence and Etiology

a. Statement of the problem (1-2 paragraphs)

For over a century, pathological lying has been recognized and discussed among various professionals. In fact, in 1890 the American Psychologist G. Stanley Hall wrote about pathological lying in children. Pathological lying has carried many names, including pseudologia phantastica, habitual lying, compulsive lying, morbid lying, and mythomania. Yet, the zeitgeist appears to have left many of these writings on pathological lying in the past or scattered among the literature. Today, we find that pathological lying is a term that is more commonplace or easily recognized in popular culture, though it is not fully understood. Pathological lying has not been formally recognized as a psychological disorder within diagnostic systems. Simply, a person who struggles with pathological lying is unable to receive a diagnosis or suitable treatment for their problematic behavior.

Recent theory and research have supported the existence of pathological lying and support for its recognition as a distinct diagnostic entity (Curtis & Hart, 2020; 2021; 2022). Curtis and Hart (2020) recruited 623 adults and found that the onset of pathological lying was mostly during adolescence (10-20 years old), indicating cognitive developmental markers for etiology. To further understand pathological lying, the current study aims to examine the pathological lying profile among an adolescent sample and the role of executive functioning and psychopathology.

b. Theoretical or conceptual framework for the study (1-2 paragraphs)

Developmental research has revealed that most people begin to lie around the age of three

(Sodian, 1991; Talwar & Lee, 2002) and appears to be related to cognitive development (Talwar & Lee, 2008; Talwar & Crossman, 2011). In particular, executive functioning (i.e., inhibitory control, working memory, planning, cognitive flexibility) help support the emergence and development of lie-telling abilities and may related to development of prosocial and antisocial lies (Talwar & Crossman, 2011). Executive functioning related to working memory and inhibitory control play a role in children's ability to tell prosocial lies (Williams et al., 2016). Serota and colleagues (2010; 2015) published studies on lie frequency, that established some of the basic framework for revisiting pathological lying. Serota and colleagues' findings on lie frequency revealed that while the average number of lies people tell per day is around two, the distribution of lying behavior is positively skewed, with most people telling no lies in a given 24-hour period and a small group of people telling many lies. Based on these findings and other studies, Levine's (2014; 2020) truth-default theory suggests that most people are honest most of the time. However, some tell numerous lies. From this literature and a model of psychoathology, Curtis (2019) proposed a theory of pathological lying using a model of psycholopathology: frequency of behavior, functioning, feeling pain, and fatal (Curtis & Kelley, 2016).

Curtis and Hart (2020) tested this theoretical model, finding support for the existence of pathological liars based on a model to understand psychopathology (Curtis & Kelley, 2016; 2020), the biopsychosocial model of psychopathology (Engel, 1996), and alignment with the major nosological classification systems (i.e., DSM-5 and ICD-11). Drawing from the framework of previous definitions and case studies, grounded in the theory of psychopathology, and adhering to major nosological classification systems, Curtis and Hart (2020) proposed a definition of pathological lying as "a persistent, pervasive, and often

compulsive pattern of excessive lying behavior leading to clinically significant impairment of functioning in social, occupational, or other areas, causing marked distress, and posing a risk to the self or others, occurring for longer than a six month period" (p. 63).

c. Brief review of relevant research, if applicable (1-2 paragraphs)

Levine and colleagues (2015) measured teenagers' lie frequency, finding that teens lie significantly more than adults, and the distribution is positively skewed, with a small minority lying prolifically. Some of these teenagers may represent pathological liars. Curtis and Hart (2020) found that adults who were pathological liars indicated that the onset of their excessive lying occurred in adolescence.

Lavoie and colleagues (2017) examined 229 children, aged 3-14 years old, and found three classes of liars: occasional (51%), instrumental (42%), and antisocial (7%). The antisocial liars represented the highest frequency of lies for avoiding punishment, blaming others, and protecting the self. These findings further indicate a developmental trajectory of lying behavior, where most children, as they develop, tell fewer lies. Antisocial lie-telling appears to peak in adolescence and declines into adulthood (Talwar & Crossman, 2011). "This decrease in frequency in adulthood may reflect adults' increased cognitive ability to adaptively deal with their social environments without resorting to deceptive strategies, which are socially condemned and risky behaviors that can damage one's own credibility" (Talwar & Crossman, 2011, p. 150). Thus, executive functioning deficits or diminished cognitive ability may be related to pathological lying in adolescence.

An extensive body of research has examined the role of executive functioning related to conduct disorder (see Austin et al., 2020; Moffitt, 1993, 2006; Ogilvie et al., 2011). Impairments in executive functioning have been related to the persistence of child conduct

problems. Largely, children and adolescents who have difficulties with controlling their thoughts and behaviors may be more likely to demonstrate conduct problems. Thus, executive functioning may be related within conduct problems and lying behaviors.

d. Research questions, including hypotheses to be tested (1-2 paragraphs)

To further understand pathological lying, the aim of the current study was to examine the profile among an adolescent sample.

Question 1: Is there a group of adolescents who fit the model of pathological lying?

Prediction 1: We predicted that there would be a group of adolescents who are pathological liars. That is, there would be a small percentage of the population who report excessive lying, for a longer time-period than the general adolescent population, causing impairment in functioning, distress, and posing danger to themselves or others.

Question 2: Is pathological lying in adolescents associated with executive functioning deficits?

Prediction 2: We predict that adolescent pathological liars would show deficits in executive functioning and activity impulsivity control scores compared to typical adolescents.

Question 3: Is pathological lying in adolescence distinct from other psychopathologies?

Prediction 3: Adolescent pathological liars would be a distinct group of individuals that reveal excessive lying and do not demonstrate symptoms of conduct disorder.

e. Description of methodology, including the data set or data collection method, estimated sample size, and proposed analytic techniques (up to 1-2 pages)

Participants: A total of 555 adolescent participants (10-18 years old) and their parents were recruited and retained for the study. Chi-square analyses revealed non-significance

between the pathological liar group and non-pathological liar group for age, sex, school grade, and family income ($p < .05$).

Materials: The survey will include a lie frequency assessment, the Pathological Lying Inventory, Diagnostic Interview Schedule for Children (DISC), the Delis-Rating of Executive Functions (D-REF), and a demographics questionnaire. The lie frequency prompt and assessment developed by Serota and colleagues (2010) and Serota and Levine (2015) asked participants to report the frequency of lies told within the past 24 hours. The Pathological Lying Inventory (PLI) is a 33-item measure that contains six factors that measure pathological lying. The PLI was developed and validated in an adult population, so a modified version for adolescents will be used in this study. The Diagnostic Interview Schedule for Children (DISC) is a highly structured online interview compatible with DSM-5 and ICD-11. The Delis-Rating of Executive Functions (D-REF) is a 36-item inventory that assesses the frequency of observed behaviors that identify executive function problems in children and adolescents. The demographics questionnaire asked participants to provide information about age, sex, ethnicity and race, education, income, and previous history of mental diagnosis.

Procedure: The study was conducted via Psychdata, a secure research administration platform. A link to the study was posted in Prolific research system. Those who participated in Prolific were paid $10 for their participation. We also posted the link on Facebook and Twitter pages and accounts of individuals the PI knew, posted on a subreddit forum r/samplesize and Reddit forums related to pathological and compulsive lying. The Reddit forums are open and public forum where individuals can post or complete online surveys for school or work purposes and a forum where individuals discuss pathological lying

(respectively). Individuals browsing Facebook or the subreddit would see the title: "Children Lying Study (for parents of adolescents)", followed by the description: "Please consider participating in this study by Drs. Curtis, Hart, and Talwar, which is an online survey. This survey asks parents to report on their children's lying behaviors and asks parents if their children may participate by reporting on their lying behaviors. The study will take approximately 1 hour to complete and $10 will be provided for your participation through Prolific." After selecting the link, participants were provided an informed consent and assent. Once the adolescent and parent have provided consent and assent, the adolescent participants were asked to complete the various measures. After completing the measures, the participants were thanked and the $10 payment will be made via Prolific.

Results

A binomial logistic regression was performed to examine the effects that lie frequency, functioning, distress, and danger had on the likelihood that participants were correctly classified as pathological liars. The logistic regression model was statistically significant, $\chi 2(75) = 160.54$, $p < .001$. The model explained 54% (Nagelkerke R2) of the variance in the identification of pathological liars and correctly classified 94% of cases. Of 555 participants, there were 63 that were identified as a pathological liar by their parents.

In support of our first hypothesis, we found group of adolescents who fit the model of pathological lying, distinguished from the normative sample. A multivariate analyses of variance (MANOVA) revealed statistical significance when comparing the pathological lying adolescents to the non-pathological lying adolescents across lie frequency, functioning, distress, and danger, F (4, 515) = 25.00, $p < .001$; Wilk's $\Lambda = 0.84$, partial $\eta^2 = .16$.

The pathological liars (PL) reported telling an average of 9.84 lies per day (*SD*= 13.63), which was significantly more than the non-pathological liars (nPL; *M* = 2.20, *SD*= 5.23; F (1,518) = 66.57, $p < .001$). Both groups displayed the positively skewed lying distribution, with the normative group having a mode = 0, Median = 1, Skewness = 6.31, and Kurtosis = 54.14 and the pathological lying group having a mode =0, Median = 6.50, skewness= 2.59, and Kurtosis = 6.33. Moreover, there was not a significant main effect in the difference between parent report of child lies and child report of lies, F (1, 544) = .19, $p = .67$; Wilk's $\Lambda = 1.00$, partial $\eta^2 = .00$. However, there was a significant interaction effect, F (1, 544) = 21.64, $p < .001$; Wilk's $\Lambda = .96$, partial $\eta^2 = .04$. Parents estimated that their children told more lies (*M* = 4.57, *SD*= 9.15) than their children reported in the normative group (*M* = 2.20, *SD*= 5.24), whereas in the pathological lying group the parents estimated that their children told less lies (*M* = 7.82, *SD*= 7.81) than children reported telling (*M* = 9.79, *SD*= 13.48).

The PL indicated more impairment in functioning (*M* = 18.07, *SD*= 5.23) compared to the nPL adolescents (*M* = 10.85, *SD*= 6.77, $p<.001$). An repeated-measures analysis of variance (ANOVA) revealed that lies impaired some areas of functioning more than others, F (4, 55) = 12.91, $p < .001$; Wilk's $\Lambda = .52$, partial $\eta^2 = .48$. The greatest area of impaired functioning was with family relationships (see Table 1.). Regarding academics, a chi-square analysis revealed a significant difference between groups for academic grades (X^2 (4, N = 547) = 24.11, $p < .001$; see Table 2).

Table 1. Mean and Standard Deviations for Impaired Functioning of Pathological Lying Group

Functioning	Mean	SD	N
Social relationships	3.76	1.99	59
Romantic life	2.53	1.72	59
Friendships	3.49	1.89	59
My family	4.53	2.05	59
My work or school life	3.47	1.71	59

Table 2. Typical Grades Reported for PL and nPL Groups

	A	**B**	**C**	**D**	**F**	**Total**
Pathological liar group	7	25	27	1	0	60
Non-pathological liar group	137	242	91	12	5	487

The pathological lying group also displayed greater distress (M = 3.38, SD= 1.83) than the normative group (M = 2.21, SD= 1.60, p<.001). The lies from the pathological lying group made them more prone danger (M = 5.36, SD= 3.44) compared to non-pathological liars (M = 3.58, SD= 2.46, p<.001). The Lastly, the PL had higher scores on the Pathological Lying Inventory (PLI; M = 114.98, SD= 42.28) compared to nPL (M = 74.70; t= -7.09 (533), p<0.001).

In support of our second hypothesis, we found D-REF Total Composite scores were significantly elevated in the PL sample (M = 59.94, SD= 11.27) compared to the nPL sample (M = 31.11; SD= 27.46, t= -13.29 (153), p<.001). D-REF T-scores below 55 are considered within the normative range and scores 60 or higher indicate problems or deficits. A MANOVA revealed that DREF scores across all three domains (e.g., Behavioral, Emotional, and Executive) were significantly higher for the PL group compared to the nPL group, F (3, 394) = 18.39, p < .001; Wilk's Λ = 18.39, partial η^2 = .12. Specifically, executive functioning scores were significantly elevated in the PL sample (M = 61.08, SD = 13.26) compared to the nPL sample (M = 31.84, SD = 28.48; t=-12.09 (128), p<.001), indicating problems in executive functioning (planning, executing, and regulating cognitions, emotions, and behaviors; see Table 3). Additionally, there was a significant difference between sub-domains of the D-REF between the PL group and nPL group, F (3, 394) = 18.39, p < .001; Wilk's Λ = 18.82, partial η^2 = .13 (see Table 4).

Attention/working memory and activity level/impulse control were clinically elevated (above 60).

Table 3. D-REF Scores for the Pathological Liar Group

	Behavior	Emotion	Executive Functioning	Total Composite
N	50	50	50	50
Mean	59.92	56.70	61.08	59.94
SD	10.91	10.62	13.26	11.27

Table 4. D-REF Sub-Domain Scores for the Pathological Liar Group

	Attention/ Working Memory	Activity Level/ Impulse Control	Compliance/ Anger Management
N	50	50	50
Mean	62.10	60.02	56.24
SD	13.12	10.93	11.60

Our last hypothesis was supported, in that adolescent pathological liars were a distinct group of individuals that did not demonstrate symptoms of conduct disorder. Of the 63 pathological lying adolescents, parents indicated that most of their children (n = 52; 84%) had not been formally diagnosed with a psychological disorder. A chi-square analysis was conducted to examine if there were differences between the PL group and nPL group with regard to potential diagnostic symptoms based on the DISC, finding non-significance (X^2 (1, N = 160) = .75, p = .39). Results from the DISC indicated that over half of the PL sample (n= 25; 52%) did not endorse symptoms indicative of a psychological disorder. Of the PL group who did indicate symptoms of psychopathology, the DISC did not indicate

Conduct Disorder. Rather, those who endorsed symptoms of psychopathology, the DISC suggested considerations of Obsessive-Compulsive Disorder, Social Anxiety Disorder, or some anxiety related disorder.

Conclusion

Teenagers lie more frequently than any other developmental stage, showing an inverted U across the lifespan (Levine et al., 2013; Debey et al., 2015). While teenagers may lie a lot, we found evidence of pathological lying within late childhood/early adolescence, distinct from normative lying tennagers. Moreover, there are a group of adolescence who fit the definition of pathological lying and psychopathology model suggested by Curtis and Hart (2019; 2022), in that there is a smaller group of the population who tells excessive lies that cause impairment in their functioning, marked distress, and poses some risk of danger to themselves or others. Specifically, we found that pathological lying in adolescence mostly impacted family relationships and was associated with lower academic functioning.

Some literature has suggested that the prefrontal cortex, specifically executive control, plays a role in deception. Levine (2020) suggested that people lie when the truth does not work. Thus, people may forecast that the truth will not bring forth desired consequences and telling a lie may seem like a desirable alternative. Thus, the use of honesty and deception may be mediated by executive functioning, planning for the future. In fact, as we age we may tell less lies because a "decrease in frequency in adulthood may reflect adults' increased cognitive ability to adaptively deal with their social environments without resorting to deceptive strategies, which are socially condemned and risky behaviors that can damage one's own credibility" (Talwar & Crossman, 2011, p. 150). Thus, we predicted that pathological liars may have deficits in the ability to forecast and plan, namely executive functioning, which may exacerbate lying. Our

results indicate that adolescent pathological liars showed greater problems or deficits with executive functioning compared to non-pathological lying adolescents. Specifically, executive functioning was clinically elevated more than behavioral functioning and emotional functioning for the pathological lying sample. Further, we found that pathological lairs had clinical elevations in attention/working memory and activity level/impulse control more than in compliance/anger management. Thus, pathological liars do not appear to have issues with antisocial traits and problems with conduct disorder as much as deficits in working memory and impulsivity.

Lastly, we found that most of the pathological lying sample did not have formal diagnoses and over half did not endorse symptoms indicative of psychopathology, as it currently exists in the DSM-5-TR. Of the pathological lying sample who did endorse symptoms of psychopathology, the DISC indicated that diagnoses for consideration were more aligned with obsessive-compulsive disorder or an anxiety disorder, not conduct disorder.

The results of the current study provides additional evidence of the existence of pathological lying. Specifically, pathological lying appears to exist within the onset of late childhood/early adolescence. These results further solidify the notion to include pathological lying in the future revisions of the existing nosological systems (DSM and ICD), to recognize and diagnose individuals who struggle with excessive lying. Additionally, the study uniquely adds to the existing literature on pathological lying, by providing etiological markers for understanding pathological lying. It appears that executive functioning may be the developmental marker associated with development and maintenance of pathological lying. Thus, practitioners are further equipped by having assessment markers of pathological lying. Practitioners are able to consider treatments that may be centered around executive functioning

(e.g., Cognitive-Behavioral Therapy and Habit-Reversal Training). The current study advances the area of clinical child/adolescent psychopathology by providing additional evidence of the existence of a pathological lying and cognitive and developmental markers.