



A Longitudinal Examination of the Relation Between Lie-Telling, Secrecy, Parent–Child Relationship Quality, and Depressive Symptoms in Late-Childhood and Adolescence

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Abstract

Lie-telling and secret-keeping are common behaviors during adolescence. Given the importance of honesty for building trust in positive relationships, the present study examined relations between lie-telling, secret-keeping, and relationship quality over time. Additionally, given the protective role of positive relationships in developing depression, the present study examined how lying to and keeping secrets from parents related to depressive symptoms over time. Children and adolescents ($N = 1313$; 8 to 15 years old at Time 1, $M_{\text{age}} = 11.65$, $SD = 11.75$; 50.04% male) reported on lying to parents, secret-keeping from parents, relationship quality with parents, and depressive symptoms at two time points one year apart. The results indicated that greater secret-keeping was bidirectionally associated with poorer parent-child relationship quality and greater depressive symptoms over time. Thus, keeping secrets from parents appears to be an important behavior to examine in the context of development between late childhood and adolescence.

Keywords Lie-telling · Secrecy · Dishonesty · Depression · Parent–child relationship quality

Introduction

Trust is vital for positive parent–child relationships, and a lack of trust has been found to predict a variety of negative developmental outcomes such as poor relationship satisfaction (Conley et al. 2011), low self-esteem (Kashubeck and Christensen 1995), and increased rates of depression (Armsden et al. 1990). However, dishonest behaviors that violate trust such as lie-telling (Debey et al. 2015) and secret-keeping (Lavoie et al. 2017) have been found to increase during adolescence. Thus, it is vital to understand how increased dishonesty may threaten positive development during adolescence. The present study examined longitudinal relations between lie-telling, secret-keeping, parent–child relationship quality, and depressive symptoms during late childhood and adolescence.

Parent–Child Relationship Quality

The parent–child relationship undergoes major changes during the transition from childhood to adolescence, resulting in a period of increased conflict and uncertainty. According to the expectancy violation-realignment theory, the parent–child relationship remains stable and low in conflict during childhood due to the consistency in the expectations for and reactions to both the child's and parents' behaviors. During adolescence, however, adolescents' need for autonomy or independence from parental control leads to inconsistencies in the behaviors, reactions, and expectations of both the parent and child (Collins et al. 1997). As these inconsistencies increase children experience greater conflict with their parents, which leads to children and adolescents engaging more frequently in behaviors that allow them to manage or avoid that conflict. For example, adolescents commonly report using dishonesty as a method of obtaining autonomy (by keeping behaviors or decisions from parents) while avoiding parent–child conflict (parents are not aware, thus cannot be involved in decision-making). Adolescents report both telling lies and keeping secrets as strategies they use to manage parental knowledge, awareness, and monitoring (Smetana et al. 2009).

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According to Rotenberg (1994), honesty is a vital component of trust, which is crucial in the development and maintenance of positive interpersonal relationships (Conley et al. 2011). While adolescents' increased use of dishonesty may aid in obtaining autonomy, it may also be detrimental to forming or maintaining a trusting parent–child relationship. Recommending, using, and justifying dishonesty more often during adolescence is associated with poorer relationships with parents (Finkenauer et al. 2002), characterized by low trust and poor communication (Frijns et al. 2005). While this negative association between dishonesty and relationship quality has been found consistently across studies, this research is limited by the ways in which adolescents were asked about dishonesty. Typically, adolescents are presented with hypothetical scenarios and a series of options to indicate how they would communicate with their parents about that topic (e.g., lying, keeping secrets, avoiding the issue, partial disclosure; Laird and Marrero 2010; Smetana et al. 2009). Adolescents who recommend any method of dishonesty (lying, secrecy, avoiding the issue) over full disclosure report having poorer relationships with their parents. However, different types of dishonesty may be more detrimental to parent–child relationship quality than others. In particular, while lying and secret-keeping are both dishonest behaviors, they are distinct in how the dishonesty is executed. A lie involves making a false statement with the intention of deceiving (Austin 1962; DePaulo et al. 2003; Grice 1980; Searle 1969). Keeping a secret (sometimes referred to as a lie of omission) only requires withholding or concealing information relevant to the conversation but does not require the speaker to provide alternative or false information (Bok 1989; Kelly 2002; Pennebaker 1989). Examining lying and secret keeping as distinct behaviors may aid in understanding what aspect of dishonesty may be most detrimental to relationships. For example, lying may be more detrimental because it requires the action of making a false statement (rather than the passive act of concealment). Limited evidence suggests that these two behaviors have different relationships with various outcomes, such as parent–child communication, trust, and self-esteem (Frijns et al. 2005).

Lie-telling

Adolescence appears to be a time of increased lie-telling (Debey et al. 2015). Only a limited number of studies have directly examined the relation between lying to parents and relationship quality, with findings suggesting that greater lying is associated with poorer parent–child relationships (Engels et al. 2006). For example, one study found that adolescents who lied to their parents were significantly more likely to provide a negative depiction of their relationship with their mother (Warr 2007). However, previous

studies have focused specifically on lies about prudential behaviors (e.g., health and safety concerns such as substance use or sexual behaviors). According to social domain theory (Turiel 2002), there are three primary categories of behavior: moral (e.g., cheating, stealing), conventional (social and cultural norms), and psychological (privacy, health). The psychological domain can be further divided into personal (e.g., peers, privacy, romantic relationships) and prudential (health and safety concerns) behaviors. While lies about prudential behaviors appear to be common during adolescence (Gingo et al. 2017), adolescents are more likely to engage in dishonesty regarding personal behaviors (e.g., peers and personal privacy) rather than prudential ones (Smetana et al. 2009). Thus, further research examining lying about a wider variety of topics is necessary to understand how lying more broadly is associated with the parent-child relationship.

Secret-keeping

To date, the development of secrecy has received less attention in the dishonesty literature than lie-telling. Several studies have demonstrated that children and adolescents are willing to keep secrets. Children and adolescents report keeping an average of two secrets per day (Lavoie et al. 2017). Specifically, in the context of the parent–child relationship, adolescents reported keeping two secrets from each parent across a two-week period (Smetana et al. 2010). The parent–child dynamic is an important predictor of dishonesty; for example, when parents engage in more negative parenting practices, such as harsh and authoritarian parenting, adolescents are less open with their parents (Darling et al. 2006). Furthermore, keeping secrets has been shown to be negatively associated with parent–child relationship quality (Finkenauer et al. 2002; Smetana et al. 2010) while self-disclosure (the opposite of keeping secrets) has been found to be an important predictor of positive relationships (Kerr and Stattin 2000). Interestingly, one study found that keeping secrets was a negative predictor of parent–child relationship quality over time; however, keeping secrets was only measured at Time 1, and therefore only one direction of the effect could be tested (Frijns et al. 2005).

To date, no study has examined self-reported secret-keeping *and* lie-telling in a single study assessing the association between these dishonest behaviors and the parent–child relationship. Examining both of these behaviors in a single study would allow for a greater understanding of what aspect of dishonesty in particular impacts relationships. For example, if lie-telling is damaging to relationships beyond secret-keeping, this would indicate that the additional act of providing a false response is damaging to trust over and above merely concealing

information. In contrast, if lie-telling is not related to relationship quality over and above secrecy, this indicates that concealing information, feelings, or experiences from others is the aspect of dishonesty that is most harmful to relationships. Thus, secret-keeping may be a more direct measure of the detrimental aspect of dishonesty. Furthermore, no study to date has examined dishonesty (lie-telling or secret-keeping) and parent–child relationship quality longitudinally to assess the direction of these effects over time (i.e., does dishonesty predict lower parent–child relationship quality over time or does lower parent-relationship quality predict greater dishonesty over time?).

Depressive Symptoms

Adolescence is not only a time for the development and adjustment of interpersonal relationships, but also for increased vulnerability to depressive symptoms. This may be because adolescents use coping strategies less often and less effectively than adults (Garnefski et al. 2002). While only a small portion of adolescents experience clinical levels of depression, 25% of females and 10% of males report experiencing some depressive symptoms during adolescence (Saluja et al. 2004). Experiencing depression or depressive symptoms early in life is a predictor of developing a major depressive disorder during adulthood (Aalto-Setälä et al. 2002); thus, it is important to understand what behaviors adolescents engage in that might contribute to or result from depressive symptoms to aid in reducing these numbers.

One such behavior may be dishonesty. Previous studies have explored the link between dishonesty and depression and found a positive association, where increased depressive symptoms were associated with greater secret-keeping (Finkenauer et al. 2002) and lie-telling (Warr 2007) during adolescence. In contrast, it has been found that children and adolescents who lied more often actually experienced *fewer* internalizing problems (Lavoie et al. 2017). One potential method for addressing these inconsistencies is examining the direction of these relationships across time using longitudinal methodologies. For example, a previous study examined the relation between depressive symptoms and dishonesty in hypothetical scenarios over two time points and found that children who indicated they would be dishonest with their parents in the hypothetical scenarios experienced greater depressive symptoms one year later (Laird and Marrero 2010). However, this study did not ask participants about the frequency with which they lied to or kept secrets from their parents. Examining longitudinal associations between depressive symptoms and dishonesty while accounting for relationship quality (form of social support) would provide a clearer understanding of how

dishonesty relates to depressive symptoms during adolescence.

One aspect of depression that may be important in discussing adolescent dishonesty is the negative cognitive style often present in depressed individuals. It has been suggested that individuals with a negative cognitive style are more prone to experiencing depressive symptoms because they attribute negative experiences to the self due to their low self-worth and are more likely to expect negative consequences to result from their experiences (Abramson et al. 1989). This may be associated with dishonest behaviors, such as lie-telling and secrecy, because they think about the self in this negative style; when they engage in negative or undesirable behaviors they may ruminate or focus on those behaviors. Due to their negative cognitive style they may be more impacted by dishonesty because they have a more negative perception of and expect more negative consequences to come from their dishonesty than those who do not possess a negative cognitive style. Additionally, because those experiencing depressive symptoms think about themselves and their experiences more negatively than others, they may feel a greater inclination to lie or keep secrets to hide characteristics, experiences, or emotions that they view as undesirable from others.

Social support is a protective factor for depressive disorders or symptoms, and parents are an important branch of adolescents' social support networks (La Greca and Harrison 2005). Adolescents who are dishonest about their experiences or emotions may prevent their parents from providing the support required to successfully navigate or cope with their experiences and emotions. For example, they may lie specifically about their experiences of depressive symptoms because they want to control, or remain autonomous over, how they treat or cope with those symptoms. In fact, adolescents often indicate that they prefer to make treatment-related decisions without their parents' input (e.g., attending counseling sessions without a parent present; Wisdom et al. 2006). On the other hand, they may not be lying or keeping secrets specifically about their experiences of depressive symptoms, but experiences more generally that may require support from parents to successfully navigate without negative effects. For example, adolescents may conceal information about conflict with their peers because they want autonomy in this personal domain. However, disclosing that experience to a parent would allow for support in successfully resolving that conflict and coping with negative emotions that may result from it. Thus, lying to obtain autonomy may come at the expense of adolescents' psychological well-being (Finkenauer et al. 2002).

The Current Study

The present study examined relationships between lying to parents, keeping secrets from parents, parent–child relationship quality, and depressive symptoms over time. Adolescents reported on the frequency of their lying and secret-keeping, as well as the quality of their relationship with their parents and depressive symptoms at two time points one year apart. It was expected that age would be positively related to lying. Specifically, given that the current sample ranged from late childhood to mid-adolescence and that adolescents report lying more often overall than other age groups (Debey et al. 2015; Levine et al. 2013), we expected that lying to and keeping secrets from parents would be positively related to age. As has been found in previous research, it was predicted that lying and secret-keeping would be negatively correlated with parent–adolescent relationship quality (Engels et al. 2006). Bidirectional longitudinal associations were tested, but without a specific prediction due to the lack of previous longitudinal research.

Finally, the longitudinal relations between lying to parents, keeping secrets from parents, and depressive symptoms over time were examined. Lying and depressive symptoms have not yet been examined over time; therefore, the present study examined bidirectional longitudinal associations. It was hypothesized that depressive symptoms would be positively associated with lying (Warr 2007, Engels et al. 2006); however, bidirectional relations across time were exploratory. Keeping secrets has been found to predict depressive symptoms over time, but has not been examined bidirectionally (Frijns et al. 2005; Frijns and Finkenauer 2009). Depressive symptoms may predict both lying and secret-keeping, as dishonesty may be a negative coping strategy used to avoid disclosing or to remain autonomous over how to cope with depressive symptoms. Conversely, lying and secret-keeping may lead to greater depressive symptoms because it isolates the liar from receiving support from others when needed.

Method

Participants

The present sample was drawn from a larger 3-year longitudinal study examining risk-taking behaviors. As the lying questions used were included only in the second and third years of the larger study, only the latter two waves were included in the present study (labeled as T1 and T2 for ease of comprehension). Participants consisted of 1313 children and early adolescents. At T1, participants were 8 to 15 years old ($N = 1313$, $M_{\text{age}} = 11.65$, $SD = 11.75$, 50.04% male); at

T2 participants were 9 to 16 years old ($N = 939$, $M_{\text{age}} = 12.43$, $SD = 1.72$, 50.40% male). Participants were recruited from elementary schools in a mid-sized city in Southern Ontario, Canada. Parent report indicated that 83.6% of the children and adolescents were White, 2.7% were Hispanic, 2.2% were Asian, 1.9% were Black, 1.8% were Indigenous, and 6.8% were Mixed (1% preferred not to answer). Mean levels of parental education (reported by parents and used as a proxy for socioeconomic status) fell between “some college or university (no degree/diploma)” and “completed an associate, college, or technical program/diploma”.

Primary Measures

Lie-telling

Lying to parents at each time point was measured using six questions assessing a variety of personal and prudential topics over the previous two weeks (whereabouts, social media use, school, mental health, romantic relationships, avoid punishment; e.g., *In the last two weeks, how often did you lie to your parents about where you were or who you were with?*). Participants responded on a five-point scale ranging from 1 (never lied) to 5 (lied 10 or more times). To create an overall measure of lie-telling, responses were averaged across each type of lie ($\alpha = 0.77$ and 0.81 at T1 and T2, respectively).

Secret-keeping

Keeping secrets from parents at each time point was assessed using two questions from Stattin and Kerr’s (2000) Disclosure Scale. (*How often do you keep a lot of secrets from your parents about how school is going? How often do you keep a lot of secrets from your parents about what you do during your free time?*). These questions were answered on a four-point scale ranging from 1 (almost never) to 4 (almost always). Responses on these two questions were averaged to create a composite measure of secret-keeping ($\rho = 0.64$ and 0.75 at T1 and T2, respectively).

Relationship quality

Relationship quality at each time point was measured using the Inventory of Parent and Peer Attachment (Armsden and Greenberg 1987). Parent relationship quality was assessed using a subset of seven questions, answered separately for their relationship with their mother and their father (e.g., *My mother/father cares about my point of view*). Participants responded based on how often they experience each item in the context of each relationship on a four-point scale ranging from 1 (never) to 4 (almost always). As has been done in previous research using this measure (e.g., Armsden and

Greenburg 1987; Meijer et al. 2016; Oldfield et al. 2015; Victor et al. 2019), scores were averaged across both parents to create an overall measure of parental relationship quality ($\alpha = 0.81$ and 0.87 for overall relationship quality at T1 and T2, respectively; $\alpha = 0.72$ and 0.84 for mother–child at T1 and T2, respectively; $\alpha = 0.71$ and 0.83 for father–child at T1 and T2, respectively). Relationship quality for mother- and father-child relationships were significantly correlated at each time point ($r = 0.55$ at T1 and $r = 0.60$ at T2).

Depressive symptoms

Depressive symptoms at each time point were assessed using the 20-item Center for Epidemiological Studies Depression (CES-D) Scale for adolescents (Radloff 1977; Weissman et al. 1980). Due to the large age range, with younger participants only being in late childhood, participants age 11 and younger responded to a subset of 7 questions which were chosen based on ease of comprehension. Older children and adolescents responded to the full 20-item measure. The subset of 7 items answered by all participants were used as a measure of depressive symptoms in the current analyses. Participants were asked to rate how often they had experienced each symptom in the previous week (e.g., *During the past week, I felt lonely, like I didn't have any friends*) on a four-point scale ranging from 1 (not at all) to 4 (a lot of the time). To create a composite score for depressive symptoms, participants' responses were averaged across the seven items ($\alpha = 0.83$ and 0.84 for T1 and T2, respectively).

Covariates

Adolescents provided their age and sex at each time point. To control for socioeconomic status (SES), one parent in the home reported on each parent's highest level of education. Responses were provided at T1 and averaged across parent 1 and parent 2 (see Table 1 for descriptives).

Table 1 Descriptive statistics

	Time 1 <i>M</i> (SD)	Time 2 <i>M</i> (SD)
Lying to Parents (composite)	1.49 (0.68)	2.03 (1.67)
Secret-keeping	1.53 (0.75)	1.49 (0.72)
Relationship Quality	3.03 (0.56)	3.19 (0.61)
Depressive Symptoms	1.75 (0.66)	1.78 (0.67)
Age (years)	11.65 (1.75)	12.43 (1.72)
Sex (% males)	50.04%	50.40%
Parental Education	4.12 (0.85)	–

Procedure

Participants were invited to participate in the study during visits to schools within the catholic school board in Southern Ontario, Canada, and every student grade 3 and older was invited to participate. Each year, the survey was completed in two separate parts and administered through tablets, both occurring within a 4-month period (January–April). Trained researchers and volunteers administered the surveys to participants in their classrooms during school hours. Participants were compensated with small gifts (e.g., backpacks, pencils). All participants who completed the survey at T1 were invited to complete it again at T2. Parents provided informed consent at T1; adolescents provided assent at each time point. Parents reported on demographic variables at T1 in a survey that was completed at home and submitted with the parents' consent form. All procedures were approved by a university ethics research board prior to commencing the study.

Missing Data

Missing data occurred because some students did not complete all the questions in the surveys (average missing data was 7.72% at T1, and 2.46% at T2), and because some students did not complete each part of the survey in T1 and T2 (as mentioned in the procedure, the survey each year was split into two parts that were completed at different time periods; missing data was due to absenteeism but also occasionally due to time conflicts, students declining to participate in one part of the survey, or students moving to another school district with no contact information). For the first part of the survey (containing the parent/adolescent relationship quality and secret-keeping questions), in T1 18.0% of students missed the survey and in T2 28.0% missed the survey. For the second part of the survey (containing the lying to parents and depression measures), in T1 19.0% of students missed the survey, and in T2 33.6% missed the survey. Participants who missed completing the first part of the survey in T2 reported significantly lower parent–child relationship quality at Time 1 ($p < 0.001$) than those who were present at the first part of the survey at T2. There were no differences on any of the other study measure. All measures were included in study analyses. Missing data were estimated using the full information maximum likelihood (FIML) estimation method. FIML retains cases that are missing in survey waves, thus avoiding the biased parameter estimates that can occur with pairwise or listwise deletion (Schafer and Graham 2002).

Table 2 Correlations among Time 1 variables

	1	2	3	4
1. Lying to Parents (composite) 1	–			
2. Secret-keeping 1	0.39*	–		
3. Relationship Quality 1	–0.21*	–0.35*	–	
4. Depressive Symptoms 1	0.31*	0.31*	–0.31*	–
5. Age	0.14*	0.08*	0.21*	0.13*
6. Sex	–0.06	–0.04	0.04	0.07
7. Parental Education	–0.05	–0.11*	0.16*	–0.14*

* $p < 0.05$ **Table 3** Correlations among Time 2 variables

	1	2	3	4
1. Lying to Parents (composite) 2	–			
2. Secret-keeping 2	0.47*	–		
3. Relationship Quality 2	–0.30*	–0.45*	–	
4. Depressive Symptoms 2	0.33*	0.41*	–0.44*	–
5. Age	0.08*	0.16*	–0.20*	0.14*
6. Sex	–0.02	0.01	–0.04	0.13
7. Parental Education	–0.04	–0.11*	0.15*	–0.08*

* $p < 0.05$

Results

Prior to conducting the autoregressive cross-lagged analyses, exploratory factor analyses were conducted to assess whether one composite measure of lie-telling was appropriate. Factor analyses revealed that all lie-telling items loaded onto a single factor, thus Model 1 included a composite measure averaging across responses to all lie-telling questions. Additionally, given the potential similarities in measuring lie-telling and secret-keeping, multicollinearity was assessed between these measures and was not a concern (Tolerance = 1.00, VIF = 1.00).

Analyses were carried out using autoregressive cross-lagged path analysis in Mplus8. T1 variables included lying, secrecy, relationship quality, depressive symptoms, and three covariates (age, sex, SES; see Table 1 for means and standard deviations; Tables 2 and 3 for correlations for T1 and T2 variables respectively). Correlations among T1 variables were estimated; however, correlations among covariates (age, sex, and SES) were not expected to be significant and were not estimated (Willoughby et al. 2015). T2 variables included lying, secrecy, relationship quality, and depression (see Table 1 for means). All autoregressive and cross-lag paths were estimated for lying, secrecy, relationship quality, and depression from T1 to T2, as well

as cross-lag paths from covariates to T2 variables. Any significant cross-lagged paths accounted for previous scores (autoregressive path), covariate scores, and associations between variables at each time point. As such, significant cross-lagged paths represent unique associations between T1 and T2 variables in the model.

Model Results

Model fit was well-specified, $\chi^2(3) = 5.320$, $p = 0.150$, $CFI = 0.998$, and $RMSEA = 0.024$, 90% CI [0.00, 0.057]. See Table 4 for all autoregressive and cross-lagged paths. Being older was associated with greater secret-keeping ($B = 0.054$, $SE = 0.013$, $\beta = 0.131$, 95% CI [0.071, 0.191], $p < 0.001$), greater depressive symptoms ($B = 0.046$, $SE = 0.013$, $\beta = 0.120$, 95% CI [0.054, 0.186], $p < 0.001$), and poorer parent–child relationship quality ($B = -0.097$, $SE = 0.010$, $\beta = -0.275$, 95% CI [–0.330, –0.220], $p < 0.001$) at T2. Contrary to predictions, age was not associated with lie-telling. Given that girls reported greater depressive symptoms ($B = 0.154$, $SE = 0.041$, $\beta = 0.114$, 95% CI [0.055, 0.174], $p < 0.001$), multi-group modeling was performed. The models for boys and girls were not significantly different, $\chi^2(12) = 12.83$, $p < 0.05$, thus one model is presented. Finally, secrecy and lie-telling were bidirectionally associated over time. Greater lie-telling at T1 was associated with greater secret-keeping at T2 ($p < 0.001$), and greater secret-keeping at T1 was associated with greater lie-telling at T2 ($p < 0.001$).

Lie-telling, secret-keeping and parent–child relationship quality

The expected relationship between the two measures of dishonesty (lie-telling and secret-keeping) and parent–child relationship quality was partially supported. Secret-keeping and parent–child relationship quality were bidirectionally associated. Greater secret-keeping at T1 was associated with poorer parent–child relationship quality at T2 ($\beta = -0.109$, $p = 0.001$), and poorer parent–child relationship quality at T1 was associated with greater secret-keeping at T2 ($\beta = -0.098$, $p = 0.004$). The expected relationship between lie-telling and relationship quality was not significant in either direction ($ps > 0.05$) (see Fig. 1).

Lie-telling, secret-keeping and depressive symptoms

Partial support was found for the expected relationship between dishonesty and depressive symptoms. While lie-telling was not significantly associated with depressive symptoms ($ps > 0.05$), secret-keeping was bidirectionally associated. Specifically, greater secret-keeping at T1 was associated with greater depressive symptoms at T2

Table 4 Model 1 autoregressive cross-lagged model results

	<i>B</i>	SE	β	95% CI
Cross-lagged paths				
Lying to Parents 1 → Secret-keeping 2	0.151 ***	0.037	0.142	[0.073, 0.210]
Lying to Parents 1 → Relationship Quality 2	−0.053	0.031	−0.058	[−0.125, 0.008]
Lying to Parents 1 → Depression 2	0.063	0.037	0.063	[−0.010, 0.136]
Secret-keeping 1 → Lying to Parents 2	0.188 ***	0.040	0.185	[0.110, 0.261]
Secret-keeping 1 → Relationship Quality 2	−0.090 **	0.027	−0.109	[−0.173, −0.046]
Secret-keeping 1 → Depression 2	0.070 *	0.035	0.078	[0.003, 0.153]
Relationship Quality 1 → Lying to Parents 2	−0.058	0.052	−0.043	[−0.118, 0.032]
Relationship Quality 1 → Secret-keeping 2	−0.127 **	0.045	−0.098	[−0.166, −0.031]
Relationship Quality 1 → Depression 2	−0.120 **	0.046	−0.100	[−0.175, −0.025]
Depression 1 → Lying to Parents 2	0.002	0.045	0.002	[−0.075, 0.078]
Depression 1 → Secret-keeping 2	0.121 **	0.039	0.110	[0.041, 0.179]
Depression 1 → Relationship Quality 2	−0.111**	0.032	−0.118	[−0.185, −0.051]
Autoregressive paths				
Lying to Parents 1 → Lying to Parents 2	0.390 ***	0.041	0.347	[0.278, 0.416]
Secret-keeping 1 → Secret-keeping 2	0.322 ***	0.034	0.334	[0.268, 0.399]
Relationship Quality 1 → Relationship Quality 2	0.518 ***	0.034	0.469	[0.412, 0.526]
Depression 1 → Depression 2	0.344 ***	0.040	0.334	[0.260, 0.408]

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

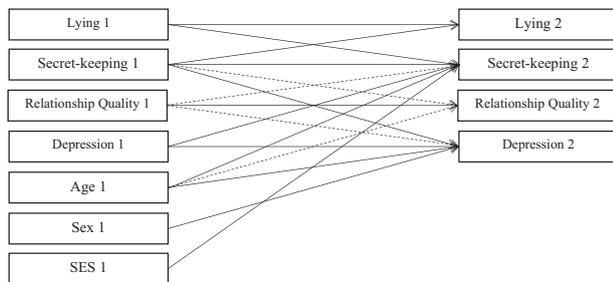


Fig. 1 Significant autoregressive and cross-lagged paths for Model 1. Positive associations are indicated by solid lines; negative associations are indicated by dashed lines. Males coded as 0, females as 1; positive association indicates females higher on outcome measures

($\beta = 0.078$, $p = 0.042$), and greater depressive symptoms at T1 was associated with greater secret-keeping at T2 ($\beta = 0.110$, $p = 0.002$; see Fig. 1).

Discussion

The transition from late childhood to adolescence appears to be a period of increased dishonesty, particularly due to the increasing desire for autonomy. Despite the increase in dishonesty that occurs during this developmental period, previous research has not yet examined longitudinal associations between lying to and keeping secrets from parents and two important developmental outcomes: parent–child relationship quality and depressive symptoms. The goal of the present study was to examine how children and

adolescents' lies to and secrets kept from parents would be associated with parent–child relationship quality and depressive symptoms over time. Given the importance of relationship quality and depressive symptoms for children and adolescent functioning, it is important to understand how increased lie-telling and secret-keeping might be associated with these variables over time. Overall, keeping secrets from parents was negatively associated with relationship quality and positively associated with depressive symptoms bidirectionality over time.

Lie-Telling, Secret-Keeping, and Age

Contrary to predictions and previous findings, lying was not positively associated with age; however, it was found that secret-keeping was positively associated with age. More frequent secret-keeping may be a result of adolescents' desire for autonomy (Smetana et al. 2009) as well as increased levels of risky behaviors (Steinberg 2006). Adolescents may keep more secrets from their parents with age as they engage more frequently in behaviors that parents may disapprove (Rote and Smetana 2015; Smetana et al. 2010). It is interesting to note that a developmental increase in lie-telling was not found in the present investigation. These findings indicate that while there is a developmental increase in dishonesty during adolescence, it is specifically an increase in secrecy (or lies of omission) rather than lies of commission. As such, future studies should take care to differentiate between lies of omission (secrets) and lies of commission when measuring adolescents' dishonesty, given

that lies of omission may be more frequent. Additionally, future research could further examine the developmental trajectory of lie-telling by asking children and adolescents to report on more specific lies; it may be that lie-telling does not increase generally, but that there are specific behaviors about which lie-telling becomes more common. Lie-telling may only increase for adolescents that are engaging more frequently in behaviors their parents would disapprove of, such as risk behaviors like substance use. Understanding the types of lies adolescents tell may allow for honesty promotion educational programs to be more effective by targeting the lies that adolescents tell most often.

Relationship Quality

Previous research has established that parent–child relationship quality is negatively correlated with lie-telling (e.g., Engels et al. 2006; Warr 2007); however, the current study is the first to examine how lie-telling and relationship quality are associated with one another over time. Contrary to predictions, we did not find that lie-telling and relationship quality were associated with one another longitudinally. We may have failed to find support for this association because adolescents reported on their own lie-telling and on parent–child relationship quality. Adolescents often feel that dishonesty is justified due to their desire for autonomy (Gingo et al. 2017; Smetana et al. 2009), thus their lies may not be damaging to their perceptions of their relationship. Future research could continue to examine lie-telling and relationship quality by asking adolescents and parents to report on parent–child relationship quality; perhaps from the adolescents' perspective lie-telling is not damaging to the parent–child relationship, but parents may report a decrease in relationship quality.

While lie-telling was not associated with relationship quality, there was a significant negative bidirectional association between keeping secrets from parents and parent–child relationship quality over time. First, keeping more secrets from parents was associated with poorer relationship quality over time. This finding suggests that keeping secrets from parents leads to poorer relationships, and that keeping secrets may prevent children and adolescents from forming or maintaining positive, trusting relationships with parents. Second, poorer relationships with parents was associated with greater secret-keeping over time. This direction of effects suggests that children and adolescents who do not trust or feel supported and understood by their parents are more likely to conceal their experiences from them. Additionally, the bidirectional nature of this association suggests that this could be a problematic cyclical pattern, where poor relations lead to greater secrecy, which leads to poorer relationships, and so on. Addressing dishonesty in childhood and ensure that

parents have effective strategies for encouraging honest communication with their children early on could be vital to ensuring that the parent–child relationship is maintained throughout adolescence.

Lie-telling and secret-keeping were significantly correlated with one another, but only secret-keeping shared unique variance with relationship quality over time. The association between relationship quality and secret-keeping but not lie-telling suggest that secret-keeping may represent the aspect of dishonesty that is most detrimental to relationship quality: concealing information, experiences, or emotions. Importantly, these findings emphasize the child's role in determining parent–child relationship quality. It is likely that adolescent dishonesty goes undetected, given parents' inability to detect their children's dishonesty (Evans et al. 2016; Talwar et al. 2015); however, adolescents who are dishonest often perceive others to be more dishonest as well (Evans and Lee 2014), suggesting adolescents' own dishonesty changes their perception of the relationship. When adolescents engage in behaviors that violate trust, such as secrecy, they understand the implications this has for their relationship which negatively influences their perception of the quality of that relationship.

Depressive Symptoms

The final goal of the study was to examine how dishonesty would be associated with depressive symptoms over time. Understanding how dishonesty contributes to or results from depressive symptoms early in life may provide an opportunity to prevent more serious symptoms from developing. Limited previous research has established a negative correlation between honesty and negative psychological outcomes, such as depression (Warr 2007), but no prior study to date has examined how dishonesty may be associated with depressive symptoms longitudinally. While we did not find that lie-telling was associated with depressive symptoms, there was a significant positive bidirectional association between depressive symptoms and secret-keeping.

Greater secret-keeping was associated with greater depressive symptoms over time. This finding suggests that adolescents who conceal information from their parents experience depressive symptoms at higher rates. Concealing thoughts, experiences, or emotions from parents may isolate the child in a way that may lead to them feeling less supported. The opposite direction was also true, that adolescents who experience depressive symptoms keep more secrets from their parents. They may be concealing their experiences more generally, or they may be concealing negative experiences in particular. Adolescents who experience depressive symptoms may feel less capable of coping with conflicts or negative emotions, but may also

feel less inclined to disclose those experiences to parents to ask for support to cope with them. They may feel more ashamed about these negative experiences and therefore less likely to discuss them with their parents, preventing them from receiving support. Thus, adolescents with depressive symptoms keep secrets at higher rates.

One key feature of depression is a negative cognitive style (Lee et al. 2010). Depressed individuals think about negative experiences as stable and due to their own low self-worth (Abramson et al. 1989). As a result, children and adolescents experiencing depressive symptoms may think about and remember their own behaviors in a more negative light than adolescents who experience limited symptoms. Thus, adolescents experiencing depressive symptoms may be more likely to ruminate on and remember their negative behaviors, such as secret-keeping, and therefore more likely to remember and report higher levels of secrecy compared to others. Future studies could track secret-keeping more closely by asking adolescents to record secret-keeping on a daily basis to avoid this potential memory bias. Additionally, this negative cognitive style may lead to a more negative perception of the self. Adolescents may feel more inclined to conceal parts of themselves that they feel embarrassed or ashamed of, and thus keep more secrets than those who experience low levels of depressive symptoms.

Limitations

While this study contributes to our understanding of lie-telling during adolescence, there are limitations to be addressed in future research. First, there are memory demands placed on participants to recall their lies and secrets. Due to this, it is likely that the current study only captured more serious or important lies that are easier for participants to remember over longer periods of time. Future research could utilize a diary methodology where participants record their lies throughout the day rather than trying to remember over a longer period of time to address this concern. Additionally, the current study asked one question regarding each topic of lie-telling. Future research could expand the lie-telling measure to include several questions regarding each topic to ask more specific questions regarding various topics of lie-telling. While we did measure lie-telling across various items, we did not measure the extent to which adolescents actually engage in the behaviors they lie about. Future research could address this by also measuring adolescent substance use, rule-breaking, romantic relationships, and other behaviors they may lie about to assess lie-telling and secret-keeping in relation to how often they engage in these behaviors. For example, for adolescents who do not use drugs or alcohol, they would not need to lie to their parents about this activity.

Conclusion

Secret-keeping appears to be a detrimental behavior during adolescence. Previous research has focused on lying and secret-keeping in the context of autonomy, suggesting that dishonesty is used for this purpose in adolescence and can even be beneficial for adolescents' feelings of independence. The results of the current study suggest that secrecy in particular may also be motivated by poor relationship quality and depressive symptoms, as well as a predictor of these variables over time. Additionally, the present study highlights the importance of studying multiple forms of dishonesty within the same participants to understand which behaviors are most influential for developmental outcomes like secrecy and depression. Secret-keeping appears to be an important behavior to examine and understand in the context of development during adolescence. Importantly, parents and practitioners would benefit from understanding how secrecy may be detrimental to adolescent development in order to adequately encourage honesty in childhood and adolescence.

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Data Sharing and Declaration This manuscript's data will not be deposited.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee Brock University Research Ethics Board (reference number: 16-080) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individuals prior to participating.

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