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Psychological Distress amid Change: Role Disruption in Girls during the Adolescent Transition

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Abstract

The present study investigates the underlying cognitive, social, and behavioral tendencies that may explain why some girls are more likely to perceive the adolescent transition as disrupting and difficult, otherwise characterized as role disruption. It was hypothesized that individual differences in rumination, rejection sensitivity, peer problems, and pubertal status would contribute to why some girls perceived more role disruption during the transition from childhood to adolescence, and that girls who reported more role disruption would be at increased risk for subsequent depression. $N = 188$ girls ($M_{age} = 11.70$ years) reported on their level of pubertal development, rumination, rejection sensitivity, peer problems, and depressive symptoms at three time points approximately 4 months apart. Structural equation modeling results suggested that baseline levels of rumination and angry rejection sensitivity explained perceptions of role disruption at Time 2 more than overall levels of pubertal development, and that greater role disruption predicted subsequent depressive symptoms at Time 3. These findings highlight the importance of individual tendencies in understanding who will find early adolescence challenging.

Keywords Puberty · Role disruption · Depression · Rumination · Rejection sensitivity

Developmental transitions constitute enduring changes to the warp and weft of daily life. The ways in which individuals perceive and interpret these daily life changes can shape the psychosocial significance of the broader developmental transition (e.g., Thomsen et al. 2016). Adolescence is notably a period of dynamic change as shifts in contextual factors, such as peer groups or classroom structure at school, and individual factors, such as pubertal development, can significantly alter the landscape of daily life. While some adolescents navigate the transition into adolescence adaptively, others perceive normative change during the adolescent transition as significantly disrupting to their daily lives, relationships, and activities (aka, *role disruption*; Rudolph et al. 2001). Girls may be at particular risk during this transition as research suggests that girls report a greater severity of psychological problems during adolescence than boys, including greater levels of interpersonal stressors, emotional reactivity, and depressive symptomology (Dahl and Gunnar 2009; Hankin et al. 2007; Nolen-Hoeksema and Hilt 2009).[1]

Perceptions of role disruption may be a strong indicator of depressive symptoms during the adolescent transition, because this construct indexes which girls are having a more difficult time adapting to normative changes. However, it is presently unclear if individual differences (i.e., pubertal development, cognitive processes, or behavioral processes) implicated in increased levels of psychological distress are associated with greater levels of role disruption during the adolescent transition, and whether role disruption is associated with depressive symptoms in the presence of other predictive factors. While puberty is globally associated with increased vulnerability, individual differences – such as rumination, rejection sensitivity, and peer problems – play a key role in the onset and maintenance of psychological distress and depressive symptoms (Chango et al. 2012; Cohen et al. 2019;

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[1] Throughout the introduction of the paper, we cite the most relevant research available. It should be noted that, some of these studies focus on adolescence rather than puberty specifically. We recognize that puberty and adolescence are not synonymous, and do not want to suggest that implications drawn from a study with an older adolescent sample can be freely applied to a pubertal sample. We note age of the sample in cited studies wherever possible and relevant.

Hankin et al. 2007). Therefore, the goals of the present study are twofold: (1) to determine which, if any, individual differences are related to role disruption in girls during the adolescent transition and (2) to examine the prospective relationship between role disruption and depressive symptoms in girls during the adolescent transition.

Role disruption encompasses perceptions of change within the domains of academics, peer and friend relationships, and parent relationships (Rudolph et al. 2001). These domains align with the major shifts that start to take place around the pubertal transition as girls may face more difficulty at school, place more importance on peers, and clash more often with parents (e.g., Baer 2002; Martin and Steinbeck 2017; Rudolph 2002). More broadly, role disruption constitutes the perception that current life circumstances are both different and more difficult than they used to be. Although all girls will experience these developmental shifts to some extent, not all girls will perceive these shifts as significantly disrupting to their daily lives. Perceptions of role disruption may therefore serve as an antecedent to negative outcomes related to depression. Prior findings with adolescents have shown that greater perceived role disruption is associated with greater perceived helplessness in matching domains (i.e. feeling disrupted in school is associated with feeling helpless in school) both in the short- and long-term (Rudolph et al. 2001). Given that attributions of helplessness have been established as prodromal predictors of depression (e.g., Nolen-Hoeksema and Girgus 1995), greater feelings of role disruption may be prospectively linked with increased vulnerability to depressive symptoms. This aligns with the clinical literature with adults and college students indicating that perceived self change is a precursor to depressive symptoms (Burrow et al. 2018; Ratner et al. 2019).

Underlying the theoretical framework of the present investigation are two major tenets of the extant literature on pubertal development and psychopathology. First, the transition from childhood to adolescence is a period of significant psychological change (e.g., Caspi and Moffitt 1991). Second, girls tend to select, process, and contribute to their environments in ways that maintain their individual predispositions over time (e.g., Ge et al. 1996). Individual differences are therefore essential to understanding why some girls navigate normative changes adaptively and why others may find these changes to be disrupting and distressing.

Although associations between role disruption and potential negative developmental outcomes have been established, it has not been established which individual factors may play a part in perceptions of role disruption. Pubertal development may be a particularly salient factor. In addition to characterizing the start of adolescence, puberty is also a period of potential psychological disruption and distress for girls (e.g., Caspi and Moffitt 1991). Pubertal changes are often jarring, and a broad body of literature documents the prevalence of psychological change, such as changes in emotional reactivity (e.g., Dahl and Gunnar 2009), and psychological distress, such as depressive symptoms (e.g., Alloy et al. 2016) during this time. Pubertal status, characterized as the amount of pubertal development at a given point in time, is moreover a critical factor in the emergence of sex differences in depressive symptoms during adolescence (Conley and Rudolph 2009; Dorn et al. 2006). One reason that puberty may be disrupting is that girls may perceive a lack of control over physical changes (e.g., Natsuaki et al. 2011). Because they coincide with physical changes already beyond their immediate control, girls may feel as though changes in other life domains (i.e., peers, parents, and school) during this transition are more difficult and disrupting.

In addition to pubertal changes, perceptions of role disruption may also be affected by girls' individual cognitive processes. Specifically of interest are the processes of rumination and rejection sensitivity, which characterize the way that girls may perceive, interpret, and reflect on their internal and external experiences. Rumination and rejection sensitivity may be particularly salient for girls at pubertal onset because adolescent girls are more likely to ruminate than boys and preadolescent girls (Hampel and Petermann 2005; Rood et al. 2009), and tend to be more anxious about social status following transitions than boys (London et al. 2007). Accordingly, these two cognitive processes may heighten perceptions of disruption in the domains of peers, parents, and school, as well as represent stable individual differences that can contribute to perceptions of role disruption.

Rumination is characterized as a repetitive and passive cognitive focus on the experience of being distressed and the causes and consequences of this distress (Nolen-Hoeksema et al. 2008). Rumination is often employed in an attempt to better solve problems. However, rumination typically leads to worse interpersonal problem-solving (Lyubomirsky and Nolen-Hoeksema 1995) and worse solution implementation (Ward et al. 2003). Accordingly, girls predisposed to rumination may be most likely both to perseverate on the changes associated with the adolescent transition and be less effective at solving problems in new developmental contexts. Prior research suggests that pubertal changes may exacerbate ruminative tendencies as more advanced pubertal status has been associated with greater levels of rumination in early adolescent girls (e.g., Alloy et al. 2016; Mendle et al. 2020). This may leave girls who ruminate especially likely to view life changes surrounding puberty and the adolescent transition as particularly disrupting and difficult. Indeed, empirical findings suggest that rumination is longitudinally predictive of depressive symptoms in early adolescents (Cohen et al. 2019).

Rejection sensitivity is the tendency to anxiously or angrily expect, perceive, or over-react to the possibility of social rejection (Downey et al. 1998). Although rejection sensitivity can be operationalized as a composite of both anxious and angry reactions, studies have indicated that there is utility in

differentiating between the two subtypes. For example, anxious rejection sensitivity is more closely associated with internalizing and friendship instability, whereas angry expectations of rejection are associated with increased conflict and aggression (Croft and Zimmer-Gembeck 2014; London et al. 2007). Rejection sensitivity also plays a role in mood and emotional well-being: studies of middle to late adolescents suggest that social and relational stressors predict subsequent depressive symptoms in highly rejection sensitive individuals (Chango et al. 2012). Given that adolescence is a period during which peer relationships increase in importance and the transition to middle school may provide new contexts of social uncertainty (e.g., London et al. 2007), highly rejection sensitive girls may report greater role disruption and distress. Prior research suggests that rejection sensitivity is linked with more advanced pubertal status in early adolescent girls (Mendle et al. 2020). Pubertal development may increase tendencies toward rejection sensitivity as girls are tasked with responding to novel social contexts regarding physical changes (e.g., heightened romantic attention from peers) and because emotional reactivity may be accentuated during this time (Dahl and Gunnar 2009).

It may also be that a sense of daily life disruption is merely the sum of manifest everyday problems such as problems with peers. During the adolescent transition, some of the most important social context changes occur in relationships and interactions with friends and other children of the same age (Rudolph 2002). Increased problems with peers may reduce perceived social support and increase perceived difficulty adjusting to life changes. As with rumination and rejection sensitivity, research indicates that girls report more interpersonal stressors than boys and that girls are more concerned about peer evaluation and the maintenance of harmonious relationships (Hankin et al. 2007; Rose and Rudolph 2006; Rudolph 2002). Further, interpersonal stressors have been linked to depressive symptoms during adolescence (Hankin et al. 2007; Rudolph 2002). Accordingly, girls may feel particularly sensitive to peer problems during the adolescent transition and feel that their consequences are more disruptive. Independent of physical changes or cognitive interpretations, it is possible that girls who experience more problems with peers may be more likely to report role disruption.

Lastly, in addition to their own contributions to role disruption and depressive symptoms during the adolescent transition, these individual predispositions may also be affected by pubertal status. Given that puberty is associated with greater negative affect, emotionality, and emotional arousal in girls (Angold et al. 1998; Petersen & Taylor 1980), pubertal status may diminish emotional clarity during the adolescent transition in such a way that increases tendencies toward rumination, rejection sensitivity, or peer problems in the face of novel or ambiguous situations. Indeed, rumination and interpersonal stressors have been longitudinally associated with pubertal status in adolescent samples (Alloy et al. 2016; Rudolph 2008), and a study of neural responses to laboratory simulations of social rejection in an adolescent sample found that more advanced pubertal development was linked with greater reactivity to rejection (Silk et al. 2014).

The Present Study

The present study had two primary goals. The first goal was to investigate the predictors of role disruption during early adolescence. We hypothesized that pubertal status, rumination, rejection sensitivity, and peer problems would contribute to role disruption, given that these all have been linked to psychological distress during the adolescent transition. In addition, we hypothesized that pubertal status would indirectly affect role disruption through rumination, rejection sensitivity, and peer problems given prior work linking pubertal status to each of these constructs. The second goal of this study was to examine the prospective relationship between role disruption and depressive symptoms in girls during the adolescent transition. Although prior findings have suggested that role disruption is associated with depressive symptoms (Rudolph et al. 2001), there remains a gap in understanding if role disruption is prospectively linked to depressive symptoms when accounting for other cognitive, behavioral, and physical processes. Establishing this prospective relationship between role disruption and depressive symptoms would help determine whether role disruption is a useful index of psychological distress above and beyond existing indicators, or if role disruption is an additional consequence of individual differences in pubertal development and cognitive and behavioral processes. We hypothesized that role disruption would predict depressive symptoms after accounting for effects of rumination, rejection sensitivity, peer problems, pubertal status, and baseline depressive symptoms.

Method

Participants

The sample included 188 girls recruited through a research partnership with [STATE AND PROGRAM NAME BLINDED FOR REVIEW]. Recruitment was facilitated through advertisement via emails and canvasing parents at drop-off for summer youth activity programs in 2015 and 2017. Girls were determined eligible if they were enrolled in programs for youth aged 10–13 years old at baseline. Occasionally, girls aged 9 ($n = 4$) and 14 ($n = 3$) years were enrolled in the 10–13 age group activities and were included in the present analyses. The average age was 11.70 years at the start of the study ($SD = 1.05$, Range: 9–14 years), 12.00 years

(*SD* = 1.04) at Time 2, and 12.27 years (*SD* = 0.88) at Time 3. In this sample, youth self-identified as primarily European American (83%), Southeast Asian (5.24%), East Asian/Pacific Islander (3%), American Indian/Native (2.25%), African American (1.87%), Hispanic/Latino, (1.12%) and biracial or another race (3.37%). Participants attended several schools in the Upstate New York area and represented a cross-section of middle school grades. The parent who completed the consent form for their child's participation were also asked to provide a self-report of their education level. Of the 75 parents who provided a self-report of their education level in this sample, 35.14% reported having a bachelor's degree, 33.78% reported having a master's degree, 17.57% reported having a doctoral or professional degree, and 13.51% reported having an associate degree or below. It should be noted that it is unclear whether more educated parents were more likely to complete the parental self-report or if these estimates accurately reflect the entire sample since the youth activity programs did not maintain data on parental education. The study was approved by the Institutional Review Board at [UNIVERSITY AND PROJECT TITLE BLINDED FOR REVIEW, Protocol # 1207003173].

Procedure

Girls participated in three waves of data collection with each measurement occasion spaced approximately 4 months apart. The four-month intervals between the three data collection points was selected to collect responses throughout the course of a school year. Accordingly, baseline measurement corresponded with the summer, Time 2 corresponded with the fall of the school year, and Time 3 corresponded with the spring of the same school year. Parents or legal guardians provided informed consent prior to study participation and all girls provided assent at each of the three measurement points. At baseline measurement, adolescents completed pen-and-paper self-report questionnaires in a quiet space monitored by the researchers. The self-report questionnaire took approximately 45–60 min to complete and assessed pubertal development, rumination, rejection sensitivity, peer problems, role disruption, and depressive symptoms. At Time 2 and Time 3, adolescents completed the same pen-and-paper self-report questionnaires at home after the questionnaires were distributed to participant addresses via mail. Participants were compensated with a gift card to either a local store or online retailer upon completion of the self-report questionnaires.

Measures

Puberty The Pubertal Development Scale (PDS; Petersen et al. 1988) is a self-report scale that assesses changes in body hair, skin, height, breast size, and onset of menstruation to measure physical maturation. Items on the PDS are measured using a 4-point scale, where 1 = *no changes yet* and 4 = *seems completed*. Menstruation is scored as 1 = *I have not yet begun to menstruate* and 4 = *I have begun to menstruate*, according to the original scoring system established by Petersen et al. (1988). The mean PDS score at baseline measurement was 12.12 (*SD* = 3.49; Range: 5–20). The summed PDS score at Time 1 was used as an indicator of pubertal status, with higher scores indicating greater levels of pubertal development. 33.52% of girls in this sample reported that they had started menstruation at Time 1. Internal consistency in this sample was $\alpha = 0.77$ at Time 1.

Rumination The Ruminative Response Scale of the Children's Response Styles Questionnaire (Abela et al. 2002; Abela et al. 2007) was used to assess tendencies towards rumination at Time 1. The Ruminative Response Scale is a 13-item self-report measure of self-focused, cognitive responses to feelings of sadness modeled after the adult version of the Response Styles Questionnaire (Nolen-Hoeksema & Morrow 1991). Items include "When I am sad, I go away by myself and think about why I feel this way" and "When I am sad, I think about my failures, faults and mistakes." Each item is scored on a 4-point scale where 0 = *almost none of the time* and 3 = *almost all of the time* and a sum score was calculated from item responses. Summed scores on the Ruminative Response Scale ranged from 0 to 39, (M = 13.28, SD = 8.89). Internal consistency in this sample was $\alpha = 0.89$ at Time 1.

Rejection Sensitivity The Children's Rejection Sensitivity Questionnaire – 6 Item Form (Downey et al. 1998) is a self-report measure that assesses the dispositional tendency for children to expect, perceive, or over-react to social rejection or potential social rejection. Participants are presented with six total scenarios and are asked to generate separate assessments of how nervous and mad they would be in each of the six circumstances. Scenarios include situations such as being chosen by peers for a group project or confronting a friend after a fight. For example: "Imagine you had a really bad fight the other day with a friend. Now you have a serious problem and you wish you had your friend to talk to. You decided to wait for your friend after class and talk with him/her. You wonder if your friend will want to talk to you." Participants are then asked how *nervous* they would feel in this scenario, how *mad* they would feel, and whether they think their friend will want to talk and listen to them about the problem. Items are scored on a 6-point scale where 1 = *not nervous* or *not mad* and 6 = *very, very nervous* or *very, very mad*. Participants are also asked to assess the likelihood of a positive outcome for each scenario, where 1 = *YES!!!* and 6 = *NO!!!* Anxious Rejection Sensitivity scores were calculated by multiplying the nervousness rating by the likelihood evaluation for each item and then summing these products. Angry Rejection Sensitivity scores were calculated by multiplying the mad rating by the

likelihood evaluation for each item and then summing these products. In this sample, the mean Anxious Rejection Sensitivity score at Time 1 was 9.23 (*SD* = 4.89, Range: 1.50 to 25) and the mean Angry Rejection Sensitivity Score at Time 1 was 7.22 (*SD* = 4.27, Range: 1 to 25.67), with higher scores indicating greater rejection sensitivity. Internal consistency in this sample was $\alpha = 0.85$ at Time 1 for the total rejection sensitivity scale, $\alpha = 0.79$ at Time 1 for the angry rejection sensitivity subscale, and $\alpha = 0.79$ at Time 1 for the anxious rejection sensitivity subscale.

Peer Problems The Index of Peer Relations was used to assess peer problems at Time 1 (IPR; Hudson 1982; Forte and Green 1994). The IPR is a 25-item measure designed to assess the severity of problems in peer relationships and frequency of peer conflict. Each item is scored on a 7-point scale where 1 = *none of the time* and 7 = *all of the time*. Items were modified to ask about "kids my age" rather than "my peers." For instance, the item "I get along very well with my peers" was modified to "I get along very well with kids my age." Total scores are calculated by taking the sum score of all items and subtracting from this value the number of total items answered. This value is then multiplied by 100 and divided by the product of total items answered multiplied by six. Total scores range from 0 to 100 where higher scores indicate greater problems with peers. A score of 30 or greater indicates a clinically relevant threshold of peer problems. Scores in this sample at Time 1 ranged from 0 to 84.67 (*M* = 27.62, *SD* = 16.90). Internal consistency in this sample was $\alpha = 0.96$ at Time 1.

Role Disruption Perception of changes in life circumstances was assessed with the Role Disruption Questionnaire at Time 2 (RDQ; Rudolph et al. 2001). The RDQ is a 20-item self-report measure that asks respondents to rate how disrupted they currently feel relative to the previous year (e.g. "Compared to last year, I feel like I do not fit in as much with other kids at school"). Items reflect experiences in multiple domains, which include academic, peer, friend, and family. Each item is rated on a 5-point scale, ranging from 1 = *not at all* and 5 = *very much.* Responses were summed together for an overall score of role disruption with higher scores indicating greater perceived disruption. In this sample, sum scores ranged from 20 to 83 (M = 35.05, SD = 12.08). Internal consistency in this sample was $\alpha = 0.89$.

Depressive Symptoms The Center for Epidemiological Studies Depression Scale for Children (CES-DC; Radloff 1977) is a 20-item self-report measure developed for studying depressive symptomology in the general population. Items include "In the past week, I felt that everything I did was an effort" and "In the past week, I felt lonely." All items are scored on a 4-point scale where 0 = *rarely or none of the time* and 3 = *most or all of the time* and a sum score was calculated from item responses with higher sum scores indicating greater depressive symptoms. A score of 16 or greater signifies a clinically relevant threshold of depressive symptoms. Depression was measured at all three time points, but only Time 1 and Time 3 are included due to the design of the model. In this sample, scores on the CES-D ranged from 0 to 56 (*M* = 14.94, *SD* = 10.88) at Time 1 and 0 to 66 (*M* = 21.32, *SD* = 16.27) at Time 3. Internal consistency in this sample was $\alpha = 0.90$ at Time 1 and $\alpha = 0.95$ at Time 3.

Statistical Analysis

As a preliminary step, we examined the means and standard deviations of key variables as well as the correlations between them. Importantly, statistically significant correlations between pubertal status, role disruption, and the proposed mediating cognitive and behavioral tendency variables supports multivariate modeling of direct and indirect pathways through which pubertal change influences role disruption.

We used path analysis (structural equation modeling) to examine the prospective relationship between role disruption and rumination, rejection sensitivity, peer problems, pubertal status. In addition, path analysis was used to examine whether pubertal status had any indirect effects on role disruption through rumination, rejection sensitivity, or peer problems. Path analysis was the most appropriate method, as it permits test of direct and indirect effects of pubertal status on role disruption in longitudinal data. We tested for mediation using the procedure described by Hayes (2018) with bootstrapped 95% confidence intervals ($n = 1000$). First, we examined whether rumination, rejection sensitivity, and peer problems at Time 1 mediate effects of Time 1 pubertal status on role disruption at Time 2 (see Fig. 1). Statistically significant indirect effects (for example, the effect of pubertal status on peer problems) provide support that peer problems, rumination, and rejection sensitivity link pubertal change to role disruption. Under conditions where the direct effect of pubertal status on role disruption is not statistically significant when the indirect pathway is included, it may be concluded that effects of pubertal status are "fully mediated." As a supplemental test, we modeled the four RDQ subscales (i.e., peer role disruption, friend role disruption, academic role disruption, and parent role disruption) as individual outcomes in the mediation model to examine any domain-specific effects of the explanatory variables.

We next used path analysis to explore the prospective relationship between role disruption and depressive symptoms. The central aim of this analysis was to determine how robustly role disruption predicted subsequent depressive symptoms when accounting for baseline depressive symptoms in addition to the baseline explanatory variables that have also been linked to depressive symptoms (i.e., pubertal status, rumination,

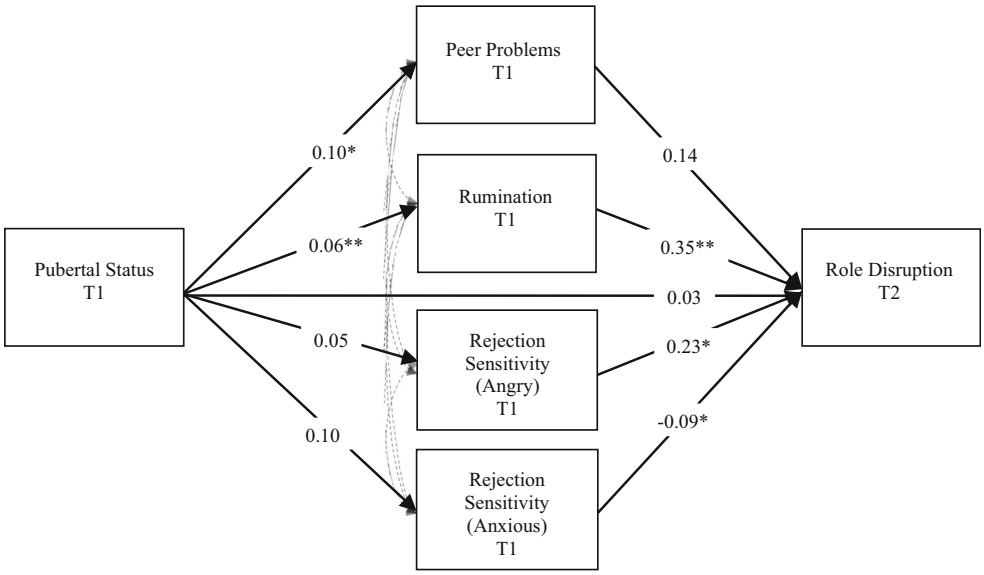

Fig. 1 Unstandardized coefficients of the mediation model are presented. Solid lines represent primary paths of the model and dotted lines represent nonprimary paths. Model fit indices: CFI = 0.997, TLI = 0.987, RMSEA = 0.031 (0.000, 0.118). Age at Time 1 was covaried but was not included in the figure. $p < 0.05$*, $p < 0.01$**; $p < 0.00$**

rejection sensitivity, and peer problems). Accordingly, the path model was run so that Time 2 role disruption, Time 1 depressive symptoms, Time 1 pubertal status, Time 1 rumination, Time 1 rejection sensitivity, and Time 1 peer problems were considered direct predictors of Time 3 depressive symptoms (see Fig. 2).

All models were fit in Mplus 7.4 using full information maximum likelihood estimation (FIML) with robust standard errors to account for missing data (Muthén and Muthén 1998-2017). There were no significant differences in pubertal development, peer problems, rumination or, anxious or angry rejection sensitivity across participants with complete data at all time points and those missing either Time 2 role disruption or Time 3 depressive symptom. This suggests that the data satisfy the conditions of missing at random (MAR), which assumes that the probability of missingness on outcome variables is uncorrelated with the values of the outcome variables themselves. FIML is preferred to listwise deletion under conditions of MAR (Enders 2010).

Age was included in all models as a covariate to establish that the effects of pubertal status were independent of the effects of chronological age. All predictor variables were mean-centered. In order to determine if the proposed mediation model added explanatory power above and beyond main effects of included variables, the mediation model was compared to a model consisting of main effects model using the Satorra-Bentler chi-square test of nested models (Satorra and Bentler 2001). Additional fit statistics were examined for each model to determine whether there was adequate model fit to the data. Model fit is considered good if the Comparative Fit Index (CFI) is greater than or equal to 0.95, Tucker-Lewis Index (TLI) is greater than or equal to 0.95 and the Root Mean Square Error of Approximation (RMSEA) is less than or equal to 0.06 (Kline 2005).

Results

Means, standard deviations, and Pearson correlations are presented in Table 1. Pubertal status had a significant positive correlation with role disruption ($r = 0.29$, $p = 0.002$). Correlations between role disruption and other variables ranged from medium to strong with rumination ($r = 0.43$, $p < 0.001$), anxious rejection sensitivity ($r = 0.40$, $p < 0.001$), and peer problems ($r = 0.47$, $p < 0.001$) all having significant, positive relationships with role disruption. Role disruption had the strongest relationship with angry rejection sensitivity ($r = 0.50$, $p < 0.001$). Pubertal status was significantly correlated with rumination ($r = 0.21$, $p = 0.004$), peer problems ($r = 0.19$, $p = 0.01$) and anxious rejection sensitivity ($r = 0.15$, $p = 0.04$), but was not significantly associated with angry rejection sensitivity. There was no significant difference between the means for depressive symptoms at Time 1 and Time 3, $t(51) = -0.82$, $p = 0.42$.

Results from the main effects model suggested that the model adequately fit the data. In the main effects model, rumination ($b = 0.35$, $p = 0.004$) and angry rejection sensitivity ($b = 0.23$, $p = 0.010$) showed significant direct effects on role disruption, but pubertal status ($b = 0.03$, $p = 0.308$), peer problems ($b = 0.14$, $p = 0.088$), and anxious rejection sensitivity ($b = -0.09$ $p = 0.232$) did not have significant direct effects on role disruption.

Results from the mediation model also indicated that that the model adequately fit the data (see Fig. 1). The Satorra-Bentler chi-square test of nested models indicated that the mediation model explained the data better than the main effects model (S-B$\chi^2 = 11.91$, $df = 4$, $p = 0.018$). Accordingly, model coefficients and 95% bias-corrected bootstraps were examined to determine direct and indirect effects on Time 2 role disruption (see Table 2), with indirect effects modeled

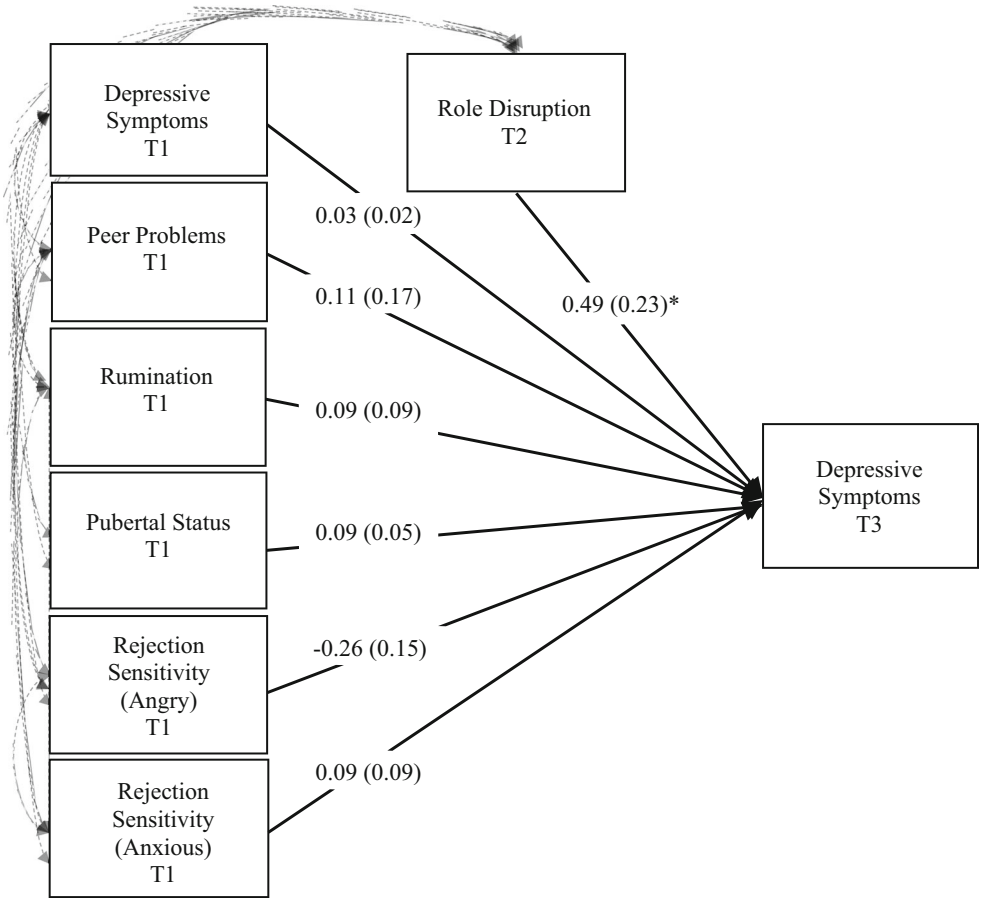

Fig. 2 Unstandardized coefficients of the model examining predictors of Time 3 depression are presented. Standard errors are presented in parentheses. Solid lines represent primary paths of the model and dotted lines represent nonprimary paths. Model fit indices: CFI = 1.000, TLI = 1.000, RMSEA = 0.00 (0.00, 0.00). Age was covaried but was not included in the figure. $p < 0.05$*, $p < 0.01$**; $p < 0.001$***

from pubertal status on role disruption via peer problems, rumination, anxious rejection sensitivity, and angry rejection sensitivity. There were four main findings from the mediation model. First, similar to the main effects model, rumination ($b = 0.36$, $p = 0.004$), angry rejection sensitivity ($b = 0.22$, $p = 0.016$), and age ($b = 0.32$, $p = 0.002$) had significant direct effects on role disruption. Second, pubertal status had significant direct effects on peer problems ($b = 0.14$, $p = 0.005$) and rumination ($b = 0.08$, $p = 0.001$) but not angry rejection sensitivity ($b = 0.11$, $p = 0.107$) or anxious rejection sensitivity ($b = 0.13$, $p = 0.101$). Third, there was a significant indirect effect of pubertal status on role disruption via rumination ($b = 0.06$, $p = 0.019$), with rumination fully mediating the effect of pubertal status on role disruption. Fourth, indirect

Table 1 Descriptive statistics and Pearson correlations of study variables

	Measure	1	2	3	4	5	6	7	8	9
1	Age T1	–								
2	Pubertal Status T1	0.50***	–							
3	Rumination T1	0.12	0.21**	–						
4	Rejection Sensitivity (Anxious) T1	0.08	0.15*	0.39***	–					
5	Rejection Sensitivity (Angry) T1	0.22	0.08	0.33***	0.76***	–				
6	Peer Problems T1	0.19**	0.19*	0.40***	0.58***	0.56***	–			
7	Role Disruption T2	0.38***	0.29**	0.43***	0.40***	0.50***	0.47***	–		
8	Depressive symptoms T1	0.09	0.13	0.63***	0.50***	0.43***	0.56***	0.50***	–	
9	Depressive symptoms T3	0.35**	0.41***	0.35**	0.23	0.17	0.34**	0.43***	0.38**	–
	M	11.70	12.12	13.28	9.23	7.22	27.62	35.05	14.94	21.32
	SD	1.05	3.49	8.87	4.89	4.27	16.9	12.08	10.88	16.27

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

Table 2 Unstandardized estimates and bootstrapped 95% confidence intervals of the mediation model

Variable Paths	Estimate (b)	Standard Error	95% CI
Direct Effects			
T1 pubertal status → T1 rumination	0.06	0.02	0.02, 0.09
T1 pubertal status → T1 peer problems	0.10	0.04	0.02, 0.17
T1 pubertal status → T1 rejection sensitivity (angry)	0.05	0.05	−0.06, 0.14
T1 pubertal status → T1 rejection sensitivity (anxious)	0.10	0.06	**−0.02, 0.21**
T1 pubertal status → T2 role disruption	0.03	0.03	−0.03, **0.10**
T1 rumination → T2 role disruption	0.35	**0.13**	**0.10, 0.61**
T1 peer problems → T2 role disruption	0.14	**0.09**	**−0.05**, 0.30
T1 rejection sensitivity (angry) → T2 role disruption	0.23	**0.10**	**0.03, 0.39**
T1 rejection sensitivity (anxious) → T2 role disruption	−0.09	0.08	**−0.26, 0.08**
Indirect Effects			
T1 pubertal status → T1 rumination → T2 role disruption	0.02	0.01	**0.004**, 0.04
T1 pubertal status → T1 peer problems → T2 role disruption	0.01	0.01	−0.01, 0.03
T1 pubertal status → T1 rejection sensitivity (angry) → T2 role disruption	0.01	0.01	−0.01, **0.04**
T1 pubertal status → T1 rejection sensitivity (anxious) → T2 role disruption	−0.01	0.01	**−0.04**, 0.01

$N = 1000$ for bootstrap sample

effects of pubertal status through peer problems, anxious rejection sensitivity, and angry rejection sensitivity were not significant. Collectively, these findings suggest that perceived role disruption is linked with transdiagnostic cognitive processes such as rumination and angry rejection sensitivity, and that connections between pubertal status and perceived role disruption can be explained by tendencies towards rumination.

Analyses were next conducted with each RDQ subscale as the outcome variable in the mediation to determine if there were any domain-specific effects of the explanatory variables. RDQ subscales included academic ($M = 9.24$, SD = 4.15) parent ($M = 9.04$, SD = 4.22), peer ($M = 7.89$, SD = 3.61), and friend ($M = 8.88$, SD = 3.35) role disruption measured at Time 2. Subscale means did not significantly differ from each other. Results of subscale analyses using the mediation model indicated that rumination ($b = 0.10$, SE = 0.05, $p = 0.041$) and pubertal status ($b = 0.03$, SE = 0.01, $p = 0.017$) were significant direct predictors of parent role disruption. Friend role disruption was directly predicted by rumination ($b = 0.08$, SE = 0.03, $p = 0.013$) and angry rejection sensitivity ($b = 0.07$, SE = 0.03, $p = 0.006$). Peer role disruption was directly predicted by peer problems ($b = 0.09$, SE = 0.03, $p = 0.004$), as well as both anxious ($b = -0.04$, SE = 0.02, $p = 0.013$) and angry rejection sensitivity ($b = 0.06$, SE = 0.02, $p = 0.022$). No predictor had significant direct or indirect effects on academic role disruption.

Finally, a path analysis model was conducted to examine the prospective relationship between Time 2 role disruption and Time 3 depressive symptoms when accounting for baseline predictors of depressive symptoms (see Fig. 2). The model was fully saturated so that model fit indices were CFI = 1.000, TLI = 1.000, RMSEA = 0.000 (0.000, 0.000). Results indicated that Time 2 role disruption significantly predicted Time 3 depressive symptoms ($b = 0.49$, $p = 0.03$) even when accounting for baseline depressive symptoms, baseline levels of role disruption predictors, and age. No other variable significantly predicted Time 3 depressive symptoms (see Table 3 for full results).

Discussion

The adolescent transition is universal in occurrence, but not universal in experience. The present study is the first to examine pathways that may explain which girls find changes in life circumstances during early adolescence to be most distressing. Results suggest that the transdiagnostic cognitive processes of rumination and the angry subtype of rejection sensitivity are significant predictors of subsequent role disruption, and that greater levels of role disruption are prospectively associated with greater levels of depressive symptoms. Girls who interpret the changes associated with the adolescent transition as more disruptive may lean on these perceptions as they renegotiate and reevaluate themselves and their lives, setting them up for more negative appraisals. Normative changes that come with the adolescent transition, such as interacting with new peers or being given more challenging schoolwork, may also become daily reminders of how life, relationships, and activities have significantly changed.

Although our results do not suggest a direct role of pubertal status on perceived role disruption, they do indicate that girls

Table 3 Unstandardized estimates and 95% confidence intervals of the model examining predictors of Time 3 depression

Variable Paths	Estimate (b)	Standard Error	95% CI
T1 depressive symptoms → T3 depressive symptoms	0.03	0.02	−0.01, 0.07
T1 pubertal status → T3 depressive symptoms	0.09	0.05	−0.01, 0.19
T1 peer problems→ T3 depressive symptoms	0.11	0.17	−0.22, 0.44
T1 rumination → T3 depressive symptoms	0.09	0.29	−0.47, 0.65
T1 rejection sensitivity (anxious) → T3 depressive symptoms	0.09	0.09	−0.09, 0.27
T1 rejection sensitivity (angry) → T3 depressive symptoms	−0.26	0.15	−0.56, 0.04
T2 role disruption → T3 depressive symptoms	0.49	0.23	0.05, 0.93

who were more physically developed also reported more rumination and difficulties getting along with other youth of the same age. They also suggest that pubertal status is *indirectly* connected to perceived role disruption through a tendency to ruminate. Girls predisposed to rumination may be dwelling on the changes of puberty, which in turn impacts their ability to problem-solve and implement solutions in the novel, ambiguous contexts associated with the adolescent transition (Ward et al. 2003). They may also spend more time focusing on the negative changes they are experiencing, which may heighten perceptions of disruption amid life changes. In the present study, rumination fully mediated the relationship between pubertal status and role disruption and provided the pathway for all but one of the indirect effects pubertal status had on peer, friend, and parent disruption. This finding highlights the importance of rumination in explaining individual differences in perceived disruption during the adolescent transition, as some girls may rely on this internal tendency to guide them through the ambiguity of the adolescent transition. Consequently, these girls may spend more time and cognitive resources mulling over negative or uncertain information, which, as a result, may heighten perceptions of role disruption.

Cognitive and neural maturation may be important for girls' tendency to ruminate. Although ruminative tendencies have been established in children prior to puberty (reviewed in Rood et al. 2009), the prefrontal cortex is still maturing during puberty (Vijayakumar et al. 2018). In the adult neuroscience literature, rumination has been linked to functional differences in the dorsolateral prefrontal cortex (DLPFC) and anterior cingulate cortex (ACC), which are both implicated in complex cognitive processes like planning, decision-making, and emotion regulation (Cooney et al. 2010; Sin et al. 2018). Accordingly, functional differences in the DLPFC and ACC during pubertal maturation may increase individual tendencies toward ruminative response styles (Forbes and Dahl 2010).

In addition to rumination, angry rejection sensitivity, but not anxious rejection sensitivity, conferred significant vulnerability for perceived disruption. Although feelings of anger and anxiety are highly correlated, the anxious and angry subtypes of rejection sensitivity distinguish between which youth choose "fight" and which choose "flight" in response to rejection (London et al. 2007). It is possible that the increased aggression associated with angry rejection sensitivity leads to more perceived disruption than the social withdrawal associated with anxious rejection sensitivity, perhaps because confrontations with peers may feel like a clear indicator of daily role disruption. The strong and significant correlative relationship between rumination and angry rejection sensitivity additionally suggests that girls who tend toward one of these predispositions likely have tendencies toward the other one as well. Accordingly, rumination and angry rejection sensitivity may play into each other to heighten perceived role disruption wherein ruminating on negative information may guide maladaptive strategies that increase expectations of rejection. In turn, increased expectations of social rejection may prompt girls to act out negatively toward peers and further exacerbate feelings of disruption with peers and friends.

As well as highlighting predictive factors of perceived role disruption, the present findings suggest that role disruption is both correlated with and predictive of subsequent depressive symptoms. This extends prior findings in which role disruption was shown to be predictive of helplessness (Rudolph et al. 2001). Role disruption at Time 2 was predictive of Time 3 depressive symptoms even when accounting for role disruption's own predictor variables and baseline depressive symptoms. This is notable because depressive symptoms have been linked to both pubertal development and transdiagnostic cognitive processes like rumination in prior work (e.g., Alloy et al. 2016; Nolen-Hoeksema and Hilt 2009). These findings suggest that there is a robust connection between perceiving normative daily life changes as disruptive and downstream depressive symptoms. It may be that role disruption captures insight into how girls perceive themselves, others, school, and change in general, and that girls who endorse greater role disruption are also the girls who are struggling to adapt to or cope with change. As these changes continue to unfold across the adolescent transition, girls who experience more role disruption may become increasingly more distressed about these changes in a way that maps onto depressive symptoms unique from pubertal change or transdiagnostic cognitive processes like rumination. Although role disruption has not been widely used in the literature to date, present findings suggest that this measure may be beneficial in future research as an index of change that is linked to psychological distress.

Although we examined individual domains of role disruption, no single cognitive or behavioral style was predictive of role disruption in each of the domains of friends, peers, parents, and academics. These findings suggest that individual predispositions and pubertal development work together across domain changes to create an overall sense of role disruption. Rumination was predictive of both parent and friend role disruption, but not of peer role disruption. It is possible that girls are more concerned with spending time and cognitive resources on ruminating about changes to close, personal relationships first, which exacerbates their perceptions of disruptive change in these domains. Conversely, the direct effects of angry rejection sensitivity on both peer and friend role disruption suggest that girls who react angrily to rejection expectations may disrupt their relationships with kids their own age regardless of closeness. The increased aggression and peer conflict associated with angry rejection sensitivity may hinder the ability to problem-solve novel social situations during this transition. Notably, anxious rejection sensitivity had a negative relationship with peer role disruption, which seems slightly counterintuitive given that rejection sensitivity is linked to increased problems with peers (London et al. 2007). Since anxious rejection sensitivity is linked to friendship instability (Croft and Zimmer-Gembeck 2014), it may be that girls who tend toward anxious rejection sensitivity are more concerned about their interactions with friends but do not necessarily feel disrupted in these relationships, as supported by the nonsignificant pathway from anxious rejection sensitivity to friend disruption. Also notable is the result that no cognitive or behavioral variable predicted academic role disruption. Further research is needed to determine if academic disruption is purely a product of the increasing difficulty of schoolwork and expectations of independent responsibility that come with progressing grade levels.

The present study has a number of strengths, including its prospective design and that it is the first to test for predictors of role disruption during early adolescence. However, there are several notable limitations to the present findings. First, the present study included only girls in its analyses. Although girls are at elevated risk for negative outcomes associated with the challenges and stressors of puberty as compared to boys (e.g., Hankin et al. 2007; Rood et al. 2009), boys likely experience role disruption during the adolescent transition as well and future research can determine if there are gender differences in role disruption and its predictors during early adolescence. In addition, the present study is limited by a predominantly European American sample of girls. Although this is demographic make-up is reflective of the region in which the data were collected, it means that these results are likely not generalizable to the broader experiences of girls with different racial and ethnic backgrounds. Finally, it should be noted that the present study included self-report measures across all constructs. Single-informant methodologies may be subject to biases that individuals have when reporting about themselves. In particular, it should be noted that puberty was measured using the self-report PDS and self-reports of pubertal development may vary in the degree to which they reflect accurate biological maturation. However, subjective perceptions of pubertal development captured with self-report measures are psychologically informative (e.g. Mendle 2014) and may be advantageous for studies, such as this one, that target cognitive and emotional responses to development (Dorn et al. 2006).

Finally, the clinical implications of the present findings suggest that role disruption is a distinct factor in depression risk during early adolescence. Difficulty during the adolescent transition may be particularly well captured by girls' self-perceptions of changes to daily life because this indexes which girls' are struggling to adapt to normative changes. However, interventions that target the way girls perceive and react to normative changes may help reduce perceived role disruption. Findings from the present study suggest that targeting individual tendencies toward rumination and angry rejection sensitivity specifically may be beneficial. Cognitively focused expressive writing has been shown to improve long-term social adjustment in early adolescents (Travagin et al. 2016). Future research should determine if such interventions can similarly impact rejection sensitivity and rumination in early adolescent girls, and, as a result, reduce levels of role disruption and depressive symptoms.

Conclusion

Why is the early adolescent transition more psychologically vulnerable for some girls than others? The present study highlights that individual cognitive styles play a key part in perceiving disruption in response to normative daily and physical changes. In turn, perceived role disruption predicts subsequent depressive symptoms, which extends prior work correlating role disruption with feelings of helplessness and depressive symptoms. This finding has important implications for the continued use of role disruption as an index of change that may be predictive of psychological distress and depressive symptoms in the face of normative developmental changes during early adolescence.

Compliance with Ethical Standards

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

Ethical Approval All study procedures were approved by the Cornell University Institutional Review Board (IRB protocol #1207003173) and were in compliance with ethical standards.

Informed Consent Informed consent was from all individual participants included in the study (N=188).

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