

# Trajectories of Positive and Negative Behaviors from Early- to Middle-Adolescence

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**Abstract** Although the positive youth development (PYD) model initially assumed inverse links between indicators of PYD and of risk/problem behaviors, empirical work in adolescence has suggested that more complex associations exist between trajectories of the two domains of functioning. To clarify the PYD model, this study assessed intraindividual change in positive and problematic indicators across Grades 5–10, and the links between these trajectories of development, among 2,516 participants from the 4-H Study of PYD (58.1% females; 64.9% European American, 7.0% African American, 12.3% Latino/a American, 2.6% Asian American or Pacific Islander, 1.8% Native American, 3.0% multiethnic-racial, and 8.4% with inconsistent race/ethnicity across waves). Results from person-centered analyses indicated that most youth clustered in the high trajectories of positive indicators and in the low trajectories of the negative ones. Consistent with past research, overlap between trajectories of positive and negative behaviors was found. These results suggest that theory and application need to accommodate to variation in the links between positive and problematic developmental trajectories.

**Keywords** Early- to middle-adolescence · Positive youth development · Developmental trajectories · Person-centered analysis · Dual-trajectory analysis

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## Introduction

Recent years have seen a notable increase in theory and research regarding the positive development of adolescents (e.g., Lerner et al. 2009), an interest that contrasts with the traditional focus on the deficits of youth (e.g., Hall 1904). Beginning in the early 1990s, a vision that emphasized the strengths of adolescents emerged (e.g., Damon 2004; Hamilton and Hamilton 1999; Larson 2000), and youth began to be studied as resources to be developed rather than as problems to be managed (Roth and Brooks-Gunn 2003). Theory-predicated research and applications converged to provide a basis of a positive youth development (PYD) model (Damon 2004; Larson 2000; Lerner 2005), a conception linked to developmental systems theory (Lerner 2007, 2009). The PYD perspective stands as a conceptual alternative to a deficit model of the adolescent period, and its core idea is that all adolescents have the potential for healthy growth, as reflected by competence, confidence, character, connection, and caring (the Five Cs; Eccles and Gootman 2002; Lerner et al. 2005; Roth and Brooks-Gunn 2003).

The initial assumption of the PYD model was that thriving and problem behaviors would be inversely related in the intraindividual development of youth (Benson et al. 2004; Benson and Pittman 2001; Pittman et al. 2001). However, research derived from the 4-H Study of PYD, a longitudinal investigation of adolescents from Grade 5 to, presently, Grade 12, reported that different trajectories of positive and problematic behaviors characterized the development of youth in Grades 5 through 7, and that these 2 sets of trajectories were not simply inversely related (Phelps et al. 2007). As such, one goal of the present study was to expand the work by Phelps et al. (2007) to a broader span of the adolescent period. We sought to provide a fuller test of, first, whether there are diverse trajectories of

positive and negative adolescent outcomes, and, second, whether these trajectories are more consistent with the initial PYD assumption of an inverse relationship between positive and problematic development than could be inferred from the Phelps et al. (2007) findings.

The current test of the presence of, variations in, and possible connections among trajectories of both positive and negative development across adolescence constitutes a useful contribution to the literature, in that the predominant focus of past research has been on the comorbidity of problem behaviors alone (Measelle et al. 2006; Nagin and Tremblay 2001). Of course, there are good reasons why past research has focused so intensely on the problems of youth. Adolescents are at higher risk for negative outcomes, including depression and engagement in risky behaviors, than either younger children or adults (NCCP 2009a). Among adolescents, diagnosable mental health disorders reach a rate of approximately 20%, and the number of serious violent offenders that emerge in this age period is substantial as well (NCCP 2009b). Recent studies have identified the existence of distinct trajectories of depression among adolescents, including increasing and decreasing pathways, with more depressive symptoms in young adulthood among those that followed elevated trajectories during their whole childhood or starting at adolescence, compared to those who followed normative trajectories (Dekker et al. 2007). Numerous studies conducted over the past several years have consistently suggested different developmental trajectories also for risk behaviors, including starting levels and rates of change. Overall, trajectories of opposition, status violations, and antisocial behavior included life-course persistent, increasing, decreasing, and low or never present trajectories (Bongers et al. 2004, 2008; Nagin and Tremblay 1999; Odgers et al. 2008; Park et al. 2008; Pepler et al. 2008). When examining substance abuse as another form of externalizing behaviors, others have found mostly increasing trajectories that were differentiated by their onset (van Lier et al. 2009).

These person-centered studies are important in light of evidence that children and youth who experience ongoing internalizing and externalizing behavior problems are at a higher risk for later adjustment problems, including more depressive and other mental health problems in young adulthood, lower educational attainment (Dekker et al. 2007), more impaired social functioning (Bongers et al. 2008), and more serious violence and economic problems (Odgers et al. 2008). However, taking into account the core idea within the PYD perspective that all adolescents have strengths, for example, by virtue of their potential for change across development (i.e., plasticity; Lerner 2005), this exclusive focus on negative developmental outcomes leaves a gap in the empirical literature. If possible strengths and positive characteristics are not assessed, then a potentially

distorted view of the nature of adolescence may emerge, and theoretical accounts of the nature of adolescent development would be incomplete and qualitatively insufficient. Moreover, applications that relied on such accounts would be missing opportunities to use the positive characteristics of youth to promote their healthy development.

Accordingly, the assessment in the present study of both positive and problematic trajectories of adolescent development has both theoretical and applied significance. In addition, the present research may help clarify what remains the uncertain empirical status of the initial PYD model assumption of an inverse relationship between positive and problematic trajectories. In contrast to the findings of Phelps et al. (2007) noted above, findings from several studies support the existence of an inverse relationship between positive behaviors and risks/problem behaviors across the development of adolescents. For instance, in studies that examined associations among internalizing/externalizing symptoms, and different competencies, negative paths were found from social competence to internalizing problems from childhood to adolescence and from early adulthood to young adulthood (Burt et al. 2008). In addition, negative paths were found from externalizing problems in childhood to academic achievement in adolescence, which in turn contributed to internalizing problems in young adulthood (Masten et al. 2005). Moreover, research derived from analyses of the 4-H Study data set other than the one reported by Phelps et al. (2007) have also found inverse associations between positive youth development, measured in terms of the Five Cs, and depression and risk behaviors within and across fifth and sixth grades (Gestsdóttir and Lerner 2007; Jeličić et al. 2007), and across the fifth to eighth grades (Lewin-Bizan et al. in press).

While these findings underscore the longitudinal associations between positive and negative behaviors that may occur in adolescence, these studies used a variable-centered approach and failed to identify intraindividual change and covariation of both positive and negative behaviors over time. As noted earlier, most person-centered empirical work has examined trajectories of negative outcomes, and the Phelps et al. (2007) study is one of the few empirical assessments of both positive and negative trajectories. The results of this study revealed that in early adolescence (Grades 5–7) the intersection of these early adolescent trajectories was complex. For instance, for most participants, those who were high on PYD to begin with were low on externalizing and internalizing behaviors, those who were decreasing in PYD were more likely than other youth to be increasing in negative behaviors, and those who were increasing in PYD were most likely to have started higher than most youth on internalizing behaviors and to decrease over time and to be in a low stable group for externalizing behaviors. Finally, girls were more likely to be in the more

positive trajectories than boys (Phelps et al. 2007). Given these findings, there is both theoretical reason and empirical need to more systematically explore the covariation between positive and negative individual developmental trajectories across the adolescent period. Understanding the links between these behaviors is important for the promotion of positive development and prevention of negative outcomes, and thus these relations deserve more careful attention. This knowledge can point to important potential arenas for intervention efforts aimed at increasing healthy development of youth.

### The Present Study

The present study used data from the 4-H Study of PYD and sought to extend the findings from the Phelps et al. (2007) assessment of early adolescence by examining developmental trajectories of PYD, contribution, depressive symptoms, and risk behaviors from early- to middle-adolescence, across six waves of data collection (fifth to tenth grades). As such, the present research had three goals. First, we sought to identify the trajectories, or patterns of intraindividual change, in PYD, contribution, depressive symptoms, and risk behaviors across Grades 5 and 10. The second goal was to elucidate whether sex-related variations existed in these trajectories, given sex differences found in the Phelps et al. (2007) study. The third goal was to identify potentially existing relationships, or covariations, among trajectories of PYD, contribution, depressive symptoms, and risk behaviors. We addressed these issues using a person-centered approach (see Bergman and Magnusson 1997; Nagin 2005). On the basis of previous work with the 4-H Study, we expected to find various distinctive trajectories of positive (PYD and contribution) and negative (depressive symptoms and risk) behaviors, and to find that among youth with higher levels of positive behaviors, the levels of negative behaviors are lower. Nevertheless, given the complex nature of the trajectories identified by Phelps et al. (2007), we also expected to find that evidence for the “inverse assumption” would not hold for all youth.

### Method

#### Procedure

Full details of the methodology of the 4-H Study have been presented elsewhere (Lerner et al. 2005; Phelps et al. 2009). We present here those features of methodology pertinent to the focus of the present study. Overall, across all six waves of the study, 6,120 youth (59% female) in 41 states have been surveyed, along with 3,084 of their parents. Across waves,

2,527 of these students were tested two or more times. Attrition in the 4-H Study sample is not randomly distributed across schools or youth program sites. For example, in Waves 2 and 3, some principals withdrew consent for their school to participate, and thus, these students “dropped out” without having had the opportunity to decide to remain in the study. However, attrition from Wave 1 to Wave 2 for students who were allowed to be asked to remain in the study was only 10%. Of the 1,954 participants tested in Wave 2, 21.5% individually withdrew their participation from Wave 3, whereas 337 (17.5%) dropped out because of school/site attrition. In subsequent Waves (4, 5, and 6), many of the same schools did not allow us to conduct on-site data collection. Youth in these schools were contacted through mail or phone and were asked to complete the survey and mail it back or to go online to complete it. Since all youth who ever participated in the study have been consistently contacted, many youth who were not surveyed in earlier waves came back into the study in later waves. During Waves 4, 5 and 6, all youth who were part of the first three waves were contacted and, in addition, the sample was increased by expanding the recruitment of youth in 4-H clubs around the country. For new youth participants, their parents were also asked to give consent and to complete the parent survey.

#### Participants

Since this is a longitudinal study, the present report is based on 2,516 individuals (58.1% female and 41.1% male; .8% of the participants were missing sex data) who participated in at least two of the six waves of data collection and who had outcome data on at least one of the variables of interest (PYD, contribution, depressive symptoms, risk behaviors). Most of the individuals who had participated in at least two of the six waves of data collection had data on all four outcomes (2,426 participants), and only 3 individuals had data on just one outcome. At Wave 1 (Grade 5), the participants were on average 10.97 years old ( $SD = .52$ ). Across all Waves (Grades 5 through 10), the youth reflected a variety of ethnic and racial backgrounds: 64.9% European American, 7.0% African American, 12.3% Latino/a American, 2.6% Asian American or Pacific Islander, 1.8% Native American, and 3.0% multiethnic-racial (8.4% of participants reported inconsistent race/ethnicity across Waves 1 through 6).

#### Measures

##### *Positive Youth Development*

Full details about this measure, its construction, and validity/reliability are provided in Lerner et al. (2005). A brief summary of the features of this measure is described below.

At each grade, a PYD score for each participant was computed as the mean of participants' self-report on the Five Cs. PYD scores could range from 0 to 100, with higher scores representing higher levels of PYD. Means, standard deviations, and ranges for the current sample for Grades 5–10 are reported in Table 1. The Five Cs comprising the PYD construct were operationalized in the following ways:

Competence involves a positive view of one's action in domain-specific areas including social, academic, cognitive, and vocational domain (19 items for Grades 5 through 7 and 21 items for Grade 8 through 10; Cronbach's alphas computed based on data from the entire 4-H Study sample for Grades 5 through 10 range from .68 to .88).

Confidence involves an internal sense of overall positive self-worth and self-efficacy, i.e., one's global self-regard, as opposed to domain-specific beliefs (12 items for Grades 5 through 7 and 11 items for Grades 8 through 10; Cronbach's alphas for Grades 5 through 10 range from .74 to .88).

Character involves respect for societal and cultural rules, possession of standards for correct behaviors, a sense of right and wrong, and integrity are dimensions characterizing character (21 items for Grades 5 through 7 and 20 items for Grades 8 through 10; Cronbach's alphas for Grades 5 through 10 range from .89 to .93).

Connection involves a positive bond with people and institutions that are reflected in healthy, bidirectional exchanges between the individual and peers, family, school, and community in which both parties contribute to the relationship (23 items for Grades 5 through 7 and 22 items for Grades 8 through 10; Cronbach's alphas for Grades 5 through 10 range from .88 to .92).

Caring involves the degree shown of sympathy and empathy, i.e., the degree to which participants feel sorry for the distress of others (five items for Grade 5, 14 items for Grade 6, and 9 items for Grades 7 through 10; Cronbach's alphas for Grades 5 through 10 range from .83 to .89).

### Contribution

At each grade, participants responded to twelve items (9 items in Grade 5), which were weighted and summed to create a composite score of contribution. These items were from four subsets: leadership, service, helping, and ideology. Items from the leadership, service, and helping scales measured the frequency of time youth spent helping others (e.g., friends or neighbors), providing service to their communities, and acting in leadership roles. The ideology scale measured the extent to which contribution was an important facet of their personal identities and future selves (e.g., "It is important to me to contribute to my community and society"). These items are derived from existing instruments with known psychometric properties and used in large-scales studies of adolescents, i.e., the

**Table 1** Means and (standard deviations) for Positive Youth Development (PYD), contribution, depressive symptoms, and risk behaviors in Grades 5 through 10

Measure and (range)	Grade 5			Grade 6			Grade 7		
	Total sample (N = 1143)	Male (N = 512)	Female (N = 613)	Total sample (N = 1656)	Male (N = 697)	Female (N = 929)	Total sample (N = 1713)	Male (N = 694)	Female (N = 1004)
PYD (0–100)	58.83 (10.75)	57.64 (13.95)	59.85 (10.84)	75.71 (10.93)	72.78 (11.26)	77.84 (10.19)	75.83 (10.39)	73.28 (10.35)	77.56 (10.06)
Contribution (0–100)	42.71 (13.66)	41.94 (13.95)	43.37 (13.40)	44.65 (13.30)	42.25 (12.80)	46.41 (13.39)	51.84 (15.21)	48.75 (15.34)	53.91 (14.77)
Depressive symptoms (0–60)	13.73 (8.95)	14.18 (8.99)	13.37 (8.92)	12.68 (9.24)	12.31 (9.24)	12.95 (9.66)	13.18 (9.59)	11.97 (8.80)	13.99 (10.01)
Risk behaviors (0–30)	1.03 (2.15)	1.52 (2.55)	0.62 (1.64)	1.33 (2.45)	1.69 (2.57)	1.07 (2.32)	1.52 (3.06)	2.07 (3.51)	1.14 (2.65)
Measure and (range)	Grade 8			Grade 9			Grade 10		
	Total sample (N = 1321)	Male (N = 486)	Female (N = 792)	Total sample (N = 953)	Male (N = 363)	Female (N = 569)	Total sample (N = 797)	Male (N = 285)	Female (N = 497)
PYD (0–100)	71.05 (13.13)	68.31 (13.74)	72.71 (12.46)	71.61 (13.42)	67.39 (14.01)	74.21 (12.35)	71.69 (12.50)	67.98 (12.77)	73.85 (11.82)
Contribution (0–100)	52.32 (16.25)	48.15 (15.87)	54.81 (15.97)	52.86 (16.48)	48.45 (16.02)	55.71 (16.15)	54.40 (16.67)	49.53 (16.67)	57.20 (16.03)
Depressive symptoms (0–60)	13.55 (9.54)	11.66 (8.16)	14.69 (10.13)	14.43 (10.45)	12.60 (8.73)	15.64 (11.29)	12.76 (9.58)	11.33 (8.47)	13.59 (10.12)
Risk behaviors (0–30)	1.96 (3.74)	2.78 (4.78)	1.46 (2.82)	2.22 (3.82)	2.92 (4.21)	1.79 (3.49)	2.02 (3.30)	3.01 (4.31)	1.46 (2.38)

Profiles of Student Life-Attitudes and Behaviors Survey (PSL-AB; Benson et al. 1998) and the Teen Assessment Project Survey Question Bank (TAP; Small and Rodgers 1995). Contribution scores could range from 0 to 100, with higher scores indicating higher levels of contribution (Cronbach's alphas for Grades 5 through 10 ranged from .45 to .80). Means, standard deviations, and ranges for the current sample are reported in Table 1.

#### *Depressive Symptoms*

At each grade, depressive symptoms were measured by the 20-item Center for Epidemiological Studies Depression Scale (CES-D; Radloff 1977). Participants reported how often they felt a particular way during the past week (e.g., "I was bothered by things that usually don't bother me"), and items were summed to create a composite score. Scores could range from 0 to 60, with higher scores indicative of higher depressive symptomatology (Cronbach's alphas for Grades 5 through 10 ranged from .81 to .89). Means, standard deviations, and ranges for the current sample are reported in Table 1.

#### *Risk Behaviors*

Risk behaviors (pertinent to substance use and delinquency) were assessed using questions adapted from the PSL-AB and from the *Monitoring the Future* questionnaire (Johnston et al. 2007). A composite score for risk behaviors was created by weighting and combining participants' self-reported items that assessed the frequency of substance use (e.g., alcohol) in the last year with items that measured the frequency of delinquent behaviors (e.g., "how many times have you hit or beat up someone?") during the last year. The composite was comprised of a total of 9 items at Grade 5, 10 items at Grade 6, and 12 items in Grades 7 through 10. Scores could range from 0 to 30 (Cronbach's alphas for Grades 5 through 10 ranged from .70 to .86). Means, standard deviations, and ranges for depressive symptoms and risk behaviors for the current sample are reported in Table 1.

#### *Sex*

Sex was indexed using a dummy variable (0 = male, 1 = female), and used as covariate in analyses. Sample sizes of boys and girls for Grades 5–10 are reported in Table 1.

## **Results**

The present study had three primary goals. First, using the PROC TRAJ procedure in SAS 9.1, we sought to identify trajectories of positive behaviors (PYD and contribution),

and of negative behaviors (depressive symptoms and risk behaviors), from fifth to tenth grade by conducting person-centered analyses for each outcome, separately. Second, we sought to examine the sex composition of the trajectory groups by comparing the likelihood of group membership among males and females. Finally, we again employed the PROC TRAJ procedure in order to observe if and how the participants within our sample tended to cluster into different trajectories of PYD, contribution, depressive symptoms, and risk behaviors.

#### **Person-Centered Analyses**

Person-centered analyses permit analysis of patterns of intraindividual change. Such analyses allow researchers to identify distinct patterns or trajectories of change that may not be reducible to simple linear or quadratic functions available with variable-centered methods. Using developmental trajectory models (Jones et al. 2001; Nagin 2005) we can identify distinctive patterns of change in individuals and also examine how patterns of trajectories for various outcomes tend to cluster within individuals.

The PROC TRAJ procedure in SAS 9.1 is a finite mixture model approach (Nagin 2005; Nagin and Tremblay 1999) to estimating developmental trajectories. We used this method to estimate trajectory models for each of our outcomes of interest (PYD, contribution, depressive symptoms, and risk behaviors) from fifth through tenth grade.

#### **Developmental Trajectories of PYD, Contribution, Depressive Symptoms, and Risk Behaviors**

Selection of a final trajectory model for a construct requires an integration of formal statistical criteria and extant theory to make a well-founded decision regarding both (1) the number of groups to include in the model, and (2) the shape that each trajectory follows over time. In terms of statistical indicators available to help identify valid trajectory models, Nagin (2005) recommends using the Bayesian Information Criterion (BIC), Jeffrey's Bayes Factor, careful consideration of the size of the trajectory groups (i.e., the percent of participants who fall into each trajectory category), and examination of standard errors. However, none of these statistical tools provide absolute criteria for identifying the "correct" trajectory model. For example, the BIC score may continue to improve with increasing numbers of trajectory groups for a construct. Increasing the number of groups can also mean that there are very few individuals in some of the smallest trajectory groups. Therefore, some of the trajectories may potentially be so similar that they are indistinguishable from a theoretical standpoint.

**Table 2** BIC scores, changes in BIC, and percentages of participants in the smallest group for trajectory models of PYD, contribution, and depressive symptoms and risk behaviors

	BIC	Change in BIC	Size of smallest trajectory group (%)
<b>PYD</b>			
Two groups	-24768.25		36.64
Three groups	-24798.99	30.74	0
Four groups	-24555.60	-243.39	8.92
Five groups	-24586.34	30.74	0
Six groups	-24585.57	-0.77	0
<b>Contribution</b>			
Two groups	-6470.51		13.64
Three groups	-6381.49	-89.02	3.50
Four groups	-6364.84	-16.65	3.01
Five groups	-6357.74	-7.10	1.28
Six groups	-6324.90	-32.84	0.36
<b>Depressive symptoms</b>			
Two groups	-24497.45		19.75
Three groups	-24396.37	-101.08	6.32
Four groups	-24424.66	28.29	0.09
Five groups	-24359.26	-65.40	0.10
Six groups	-24296.80	-62.46	0.11
<b>Risk behaviors</b>			
Two groups	-12313.02		25.60
Three groups	-11577.44	-735.58	11.70
Four groups	-11363.74	-213.70	5.70
Five groups	-11221.39	-142.35	4.45
Six groups	-11138.60	-82.79	2.79

Table 2 reports the BIC scores for models with two, three, four, five, and six groups, along with the changes in BIC, and the percentage of participants in the smallest group for each observed outcome. Choosing trajectory models for PYD, contribution, and depressive symptoms was straightforward. In the case of PYD, the BIC score for the five-group PYD trajectory model was worse compared to the BIC score for the four-group model. Similarly, the BIC score for contribution worsened when a fifth trajectory was added to the four-trajectory model. Furthermore, the BIC continued to worsen as more groups were added. In the case of depressive symptoms, the three-group model was the best fitting model as indicated by the BIC score.

Selection of a trajectory model to describe youth risk behaviors was more complicated. The BIC score continued to improve with the addition of six and, then, seven groups to the model. However, a second important indicator of the validity of trajectory models is the size of the smallest trajectory group. When a sixth and seventh group were added to the five-group trajectory model, the size of the smallest trajectory group fell below 4%, suggesting that

these models were not a good fit. As such, the five-group trajectory model was selected for inclusion in subsequent analyses.

The second step in model estimation is determining the shape (e.g., quadratic, cubic) of the trajectories for each outcome. The same process that was followed to determine the number of trajectory groups was employed again to determine the shape of the final trajectory models. That is, after we selected the number of trajectory groups for each outcome, we relied on examination of BIC, Jeffrey's Bayes Factor, the percentage of participants who fell into each trajectory category, and standard errors to then decide on the shape of each trajectory line. Table 3 describes the shapes of the final trajectory groups. Following selection of the final trajectory models, the posterior probability of group membership for each participant can be calculated. Based on these estimates, participants were assigned to the group that best fit their observed scores. Column 1 of Table 3 indicates the percentage of participants assigned to each trajectory group. For example, the majority of participants clustered in the two highest trajectory groups for PYD (increasing-to-stable-moderate, 39%, and increasing-to-stable-high, 28.3%). Column 2 indicates the average posterior probability for membership in the groups. A

**Table 3** Percentages of the sample assigned to each trajectory group and average posterior probability for trajectory assignment

	% Participants	Average posterior probability for trajectory assignment
<b>PYD</b>		
Decreasing	6.2	.82
Increasing-to-stable-moderate	39.0	.68
Increasing/decreasing	26.5	.71
Increasing-to-stable-high	28.3	.79
<b>Contribution</b>		
Stable-low	13.5	.79
Increasing-to-stable-moderate	52.6	.74
Increasing-to-stable-high	26.9	.71
High-increasing	7.0	.77
<b>Depressive symptoms</b>		
Stable-low	71.0	.90
Stable-moderate	23.0	.78
Increasing-to-stable-high	6.0	.86
<b>Risk behaviors</b>		
Stable-very-low	47.7	.86
Stable-low	29.9	.80
Early-increasing/decreasing	4.0	.84
Increasing	13.0	.78
Late-increasing/decreasing	5.4	.85

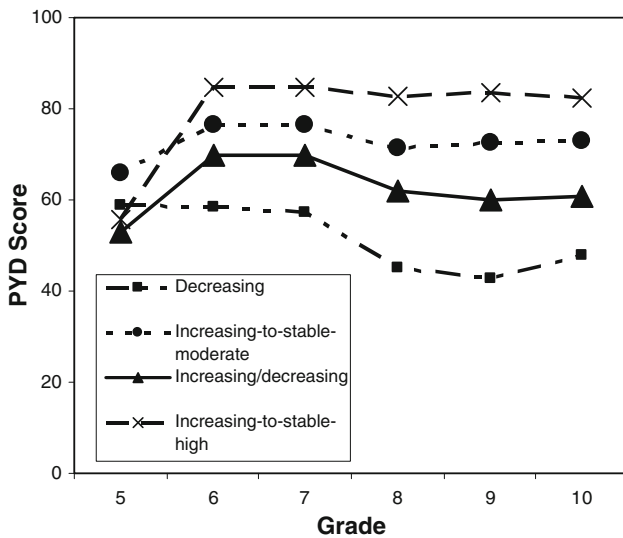


Fig. 1 Trajectories of positive youth development over time

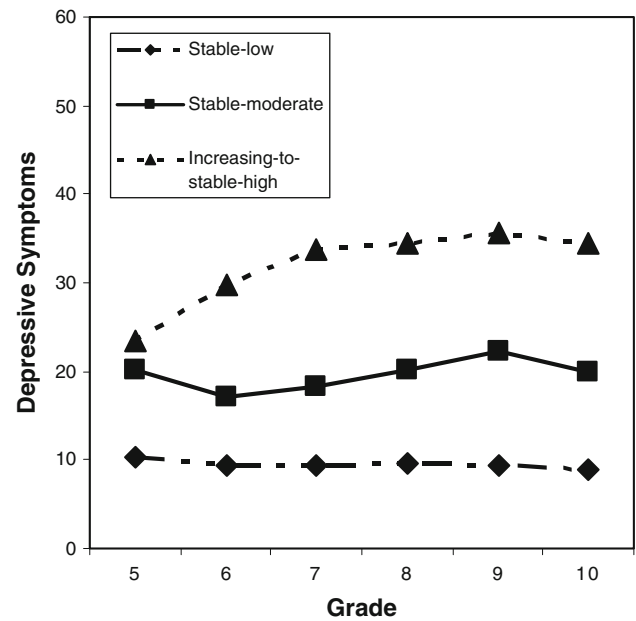


Fig. 3 Trajectories of depressive symptoms over time

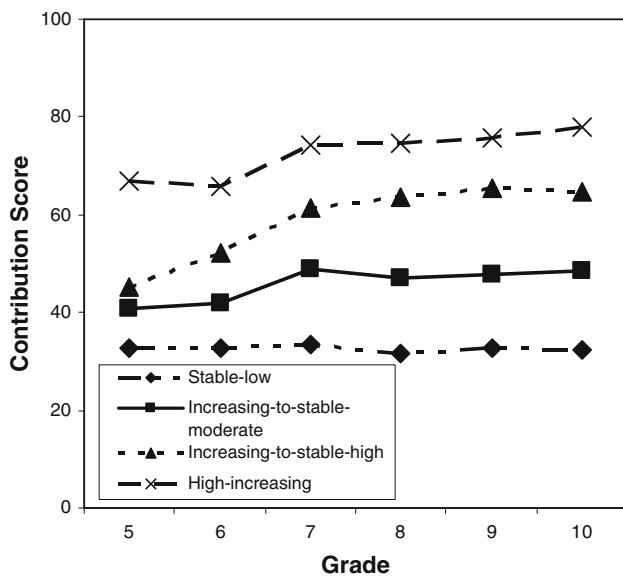


Fig. 2 Trajectories of contribution over time

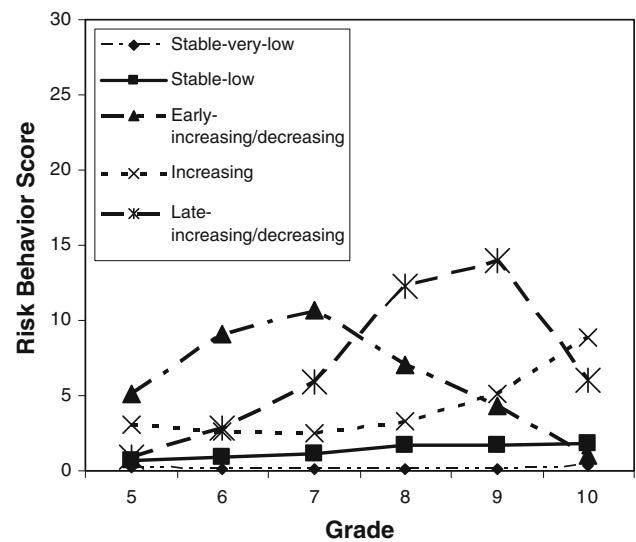


Fig. 4 Trajectories of risk behavior over time

graphical depiction of the trajectories can be found in Figs. 1, 2, 3, 4.

### Sex as a Predictor of Trajectory Group Membership

Columns 1 and 2 of Table 4 show the distribution of the total number of girls and the total number of boys, respectively, by each trajectory group for each variable. For example, 3.8% of all the girls in the sample and 9.5% of all the boys in the sample are in the decreasing PYD trajectory.

Multinomial logistic regression analyses were run separately for each of the four outcome variables to investigate

the nature of the relationship between trajectory group and sex. A reference group was chosen for each of the outcome variables, and the impact of sex on trajectory group membership was computed. Column 3 of Table 4 shows the coefficient size and significance level of sex as predictor of membership for each trajectory group (the exact *p* value that we obtained using an alpha level of .05 or less for all statistical tests), and column 4 shows effect sizes.

The reference groups for PYD and for contribution were the highest groups (increasing-to-stable-high and high-increasing, respectively). The reference groups for depressive symptoms and for risk behaviors were the

**Table 4** Percentages of participants by gender in each trajectory group and gender as predictor of trajectory group membership

	% of girls from total number of girls	% of boys from total number of boys	Coefficient (SE)	Effect size
PYD				
Decreasing	3.8	9.5	-1.57*** (.19)	-1.17
Increasing-to-stable-moderate	38.8	39.1	-0.65*** (.11)	-0.18
Increasing/decreasing	22	32.8	-1.04*** (.11)	-0.61
Increasing-to-stable-high <sup>a</sup>	35.4	18.6		
Contribution				
Stable-low	9.9	18.7	-1.39*** (.21)	-1.16
Increasing-to-stable-moderate	49.5	56.6	-0.89*** (.18)	-0.52
Increasing-to-stable-high	31.7	20.5	-0.32 (.19)	-0.21
High-increasing <sup>a</sup>	8.9	4.2		
Depressive symptoms				
Stable-low <sup>a</sup>	67.6	76		
Stable-moderate	24.6	20.5	0.30** (.10)	0.26
Increasing-to-stable-high	7.8	3.5	0.92*** (.20)	0.77
Risk behaviors				
Stable-very-low <sup>a</sup>	56.2	36.2		
Stable-low	28.4	31.7	-0.54*** (.10)	-0.05
Early-increasing/decreasing	2.6	5.7	-1.24*** (.22)	-0.61
Increasing	8.6	19.1	-1.24*** (.13)	-0.61
Late-increasing/decreasing	4.2	7.3	-0.99*** (.18)	-0.41

\*\*\*  $p < .001$ , \*\*  $p < .01$ ,  
\*  $p < .05$

<sup>a</sup> Reference category for multinomial logit analyses

lowest groups (stable-very-low and stable-low, respectively). The effect of sex on membership for other groups was then compared to the reference groups.

Results from multinomial logistic regression showed that, for PYD, girls were less likely than boys to be in the decreasing, increasing/decreasing, or increasing-to-stable-moderate trajectory groups than to be in the increasing-to-stable-high trajectory group. For contribution, girls were less likely than boys to be in the trajectory groups of stable-low or increasing-to-stable-moderate than to be in the high-increasing trajectory group. For depressive symptoms, girls were more likely than boys to be in trajectory groups of stable-moderate or increasing-to-stable-high than to be in stable-low trajectory group. Finally, for risk behaviors, girls were less likely than boys to be in trajectory groups stable-low, early-increasing/decreasing, increasing, or late-increasing/decreasing, than to be in the stable-very-low trajectory group.

#### Dual Trajectory Analysis (Positive vs. Negative)

We were also interested in comparing patterns of trajectory group membership across outcomes. That is, given our aim to elucidate further the “inverse assumption” of the initial formulation of the PYD model (e.g., see Lerner et al. 2009, for a review), we were interested in understanding patterns

of relationships, or covariations, between positive and negative developmental trajectories. For example, if a participant was identified as belonging to the increasing PYD trajectory group, what trajectory of risk behaviors was this participant likely to fall into? We pursued dual trajectory analyses using PROC TRAJ in SAS 9.1. This procedure generates the conditional probabilities of trajectory group membership for outcome X (e.g., risk behaviors) based on trajectory group membership for outcome Y (e.g., PYD).

Table 5 demonstrates the probabilities of membership in a specific risk or depressive symptoms trajectory group based on an individual’s PYD or contribution group membership status. For example, while youth in the increasing-to-stable-high PYD trajectory group were most likely to be in the late-increasing/decreasing risk behaviors group (43.23%) and the stable-low depressive symptoms group (97.63%), youth in the decreasing PYD trajectory group were most likely to be in the increasing risk behaviors group (44.82%) and the stable-moderate depressive symptoms group (56.71%). In regard to contribution, individuals in the high-increasing contribution group were most likely to be in the stable-very-low risk behavior group (43.52%) and stable-low depressive symptoms trajectory group (88.30%). Nevertheless, the findings presented in Table 5 indicate that it is only



**Table 5** Conditional probability of risk behavior and depressive symptoms trajectory group membership based on PYD and contribution trajectory group membership

	Risk behaviors					Depressive symptoms		
	Stable-very-low	Stable-low	Early-increasing/decreasing	Increasing	Late-increasing/decreasing	Stable-low	Stable-moderate	Increasing-to-stable-high
<b>PYD</b>								
Decreasing	11.56	11.12	27.84	44.82	4.66	9.80	56.71	33.49
Increasing-to-stable-moderate	25.17	40.92	5.91	12.34	15.66	61.20	32.42	6.39
Increasing/decreasing	13.87	37.67	8.94	30.25	9.27	25.08	64.90	10.02
Increasing-to-stable-high	33.35	16.19	2.58	4.66	43.23	97.63	2.37	0.00
<b>Contribution</b>								
Stable-low	29.05	25.48	20.94	17.62	6.91	39.32	45.75	14.93
Increasing-to-stable-moderate	42.44	21.32	9.86	9.10	17.28	62.64	32.78	4.57
Increasing-to-stable-high	49.19	11.16	2.82	5.90	30.93	76.84	16.06	7.10
High-increasing	43.52	14.24	0.00	2.53	39.71	88.30	8.39	3.34

possible to say that the “inverse assumption” holds “more or less” for the adolescents we have studied. Reflecting the complexity of the links between positive and problematic trajectories among adolescents, the assumption holds more for some youth, less for others, and even not at all for some youth.

**Discussion**

Given the theoretical and applied issues surrounding the identification of the nature of and the interrelations among the course of positive and negative developmental trajectories across adolescence, the present research used data from the 4-H Study of PYD (Lerner et al. 2005; Phelps et al. 2009) to address three issues. First, we sought to identify developmental trajectories and patterns of intra-individual change in both thriving, measured in terms of PYD and contribution, and problem behaviors, measured in terms of depressive symptoms and risk behaviors (combination of substance use and delinquency) across adolescence (Grades 5–10). Second, we sought to elucidate the sex composition of the trajectory groups. We did so by comparing the likelihood of group membership among males and females. Third, we sought to identify relationships between trajectories of PYD, contribution, depressive symptoms, and risk behaviors. We did so by observing how the participants within our sample tended to cluster into different trajectories of PYD, contribution, depressive symptoms, and risk behaviors. We employed the PROC TRAJ procedure to conduct the analyses pertinent to these goals.

Three main patterns of results emerged from this study. First, using developmental trajectory models (Nagin 2005), we identified distinctive patterns of change in individuals

for each of our outcomes of interest (PYD, contribution, depressive symptoms, and risk behaviors) from fifth through tenth grade, indicating that most of our participants tended to cluster in the high trajectories of the positive outcomes, and the low trajectories of the negative ones. Specifically, we found four trajectories for PYD and contribution, and the majority of our participants clustered in the two highest trajectory groups for PYD (increasing-to-stable-high and increasing-to-stable-moderate), and in the two moderately high trajectory groups for contribution (high-increasing and increasing-to-stable-high). For both outcomes, only a relatively small group of participants clustered in the decreasing (6.2% for PYD) or stable-low (13.5% for contribution) trajectories. These findings replicate findings from the prior 4-H Study by Phelps et al. (2007), in which most early adolescent (Grades 5–7) participants clustered in the two highest PYD trajectory groups, and the smallest percentage of participants clustered in the low trajectory group. For depressive symptoms, we found three developmental trajectories, and for risk behaviors we found five trajectories. For both outcomes, the majority of participants clustered in the different stable low (low, very low, or moderate) trajectories, while only a small group of participants (6% for depressive symptoms, and 13% for risk behaviors) clustered in the increasing trajectories, replicating findings from a prior 4-H Study (Phelps et al. 2007). In short, these results indicate that neither positive development nor problematic development is manifested in a single or simple way across at least the early to middle adolescent period within our sample.

A second key result, regarding the sex composition of the trajectory groups, indicated that, for positive outcomes and for risk behaviors, girls scored better than boys. Specifically, for PYD, girls were less likely than boys to be in any trajectory group but the increasing-to-stable-high

trajectory group, and for contribution, they were less likely than boys to be in any trajectory group but the high-increasing trajectory group (although for one of the trajectory groups no significant sex differences were found). Similarly, for risk behaviors, girls were less likely than boys to be in any trajectory group but the stable-very-low trajectory group. The opposite was true for depressive symptoms, where boys scored better than girls. Girls were more likely than boys to be in the moderate or high trajectory groups, compared to the low trajectory group. These findings are consistent with the sex differences found by Phelps et al. (2007).

Our third goal was to explore relationships between trajectories of PYD, contribution, depressive symptoms, and risk behaviors. Contrary to the initial formulation of the PYD model, but consistent with past research using the 4-H Study data set (Phelps et al. 2007) suggesting the interrelation of positive and negative developmental pathways, the present findings indicated that high levels of PYD and contribution were not uniformly associated with low levels of risk behaviors and depressive symptoms. For example, individuals in the highest contribution group (high-increasing) were most likely to be in the lowest risk behavior group (stable-very-low), and individuals in the highest contribution group (high-increasing) and in the highest PYD group (increasing-to-stable-high) were more likely to be in the lowest depressive symptoms group (stable-low). However, the youth in the highest PYD group (increasing-to-stable-high) were also more likely to be in a trajectory group of risk behaviors that increases (and later decreases), only followed by the likelihood of being in the lowest risk behavior group (stable-very-low).

The PYD model of adolescence emphasizes the strengths of all youth (Lerner et al. 2009). The potential for fostering positive development among youth was linked in initial formulations of the PYD model with the optimistic belief that if PYD was promoted, then risk and problem behaviors would be in turn diminished (e.g., Benson et al. 2004; Pittman et al. 2001). However, it has been argued that some experimentation with risk behaviors serves developmentally appropriate functions (Baumrind 1987; Maggs et al. 1995). For example, Baumrind (1987) has made a distinction between normal transitional risk-taking behavior in adolescents that leads to secondary gains, and pathological engagement in risk that has no secondary gains. From this perspective, risk behaviors are seen as experimentation behaviors that afford youth positive developmental opportunities (see Dworkin 2005).

In recent years, there has been empirical indications that the purported inverse relationship between positive and negative behaviors was not sufficiently nuanced. For instance, in a study of early adolescence, Phelps et al. (2007) found that, even among youth showing trajectories of

positive development that were characterized by consistently high PYD scores, there was evidence of high scores on trajectories of risk and problem behaviors. In addition, another study that examined relationships between problem behavior, including substance use and antisocial behavior, and peer relations (involvement, acceptance) among adolescents, found that increases in problem behaviors were associated with increases in peer acceptance and involvement, suggesting that problem behaviors may have both, constructive and destructive aspects (Maggs et al. 1995). In a qualitative study with college students, Dworkin (2005) found that college culture promotes participation in risk behaviors as developmentally appropriate experimentation. Taken together, these findings suggest a complex pattern of relationships that might exist between positive and negative behaviors in adolescence.

If these more nuanced and complex relationships between indices of positive and negative developmental trajectories in fact characterize the course of youth development across all of adolescence, then revisions of both the PYD model and of associated recommendations for policy and program applications need to be forwarded. Thriving in adolescence may not be seen as the absence of problems (i.e., thriving may not be conceived as the absence of bullying, drinking, unsafe sex, school failure, substance abuse, etc.) but as the growth of attributes that mark a flourishing, healthy young person, as represented by the Five Cs. Outreach efforts for prevention of engagement in risk behaviors need to be based on a thorough understanding of the ecological (e.g., parents, schools) and individual (e.g., cognitive ability, self-regulation) conditions that could result in diverse patterns of covariation among these trajectories. For this purpose, further research is needed. For example, if results were to indicate that youth actively seek out risks as a means to improve peer relationships, programs can focus on the promotion of positive social activities with the goal of advancing PYD (Dworkin 2005).

Although findings from the present study and findings from prior work suggest the need for the above-noted efforts at revision of theory and ideas for application, such steps should not be taken without recognition of the limitations of the present findings. First, the trajectory groups identified are not literally distinct groups that remain constant over time and samples. Rather, our identification of developmental trajectories can be seen as an effort to view a more nuanced approximation of developmental change compared with a variable-centered analytic strategy. Second, while controlling for sex helped to ease concerns over nuances in the composition of the trajectory groups it did not erase this concern. This study did not control for other ecological, individual, and demographic characteristics of the youth that could have shed light into the variation among each trajectory group.

Nevertheless, despite these limitations, this study contributes to the literature in important ways. First, while several prior studies have explored developmental trajectories from an intraindividual change perspective, these studies have been framed primarily by a deficit view of youth development, and examined stability and change particularly in internalizing behaviors (e.g., Dekker et al. 2007) and externalizing behaviors (e.g., Bongers et al. 2004, 2008; Nagin and Tremblay 1999; Odgers et al. 2008; Park et al. 2008; Pepler et al. 2008; van Lier et al. 2009). We believe we have advanced the literature by focusing on both negative and positive intraindividual change, by framing our study within the strength-based notion of PYD, and through finding different trajectory groups with different starting points and shapes for each outcome. Second, while a few studies acknowledged possible associations between negative and positive outcomes (Burt et al. 2008; Gestsdóttir and Lerner 2007; Gestsdóttir et al. 2009; Jeličić et al. 2007; Masten et al. 2005), they used statistical methods that did not allow them to test for covariation among trajectories for the different domains of behavior. By using a person-centered analysis that permitted us to analyze this covariation (Nagin 2005), the present research was able to discern that, although there is a relationship among PYD, contribution, depressive symptoms, and risk behaviors, the nature of the relationship is more complex than recognized in many theoretical discussions of the development of PYD (e.g., Benson et al. 2004; Pittman et al. 2001).

Indeed, given the implications of the present findings, we believe that it is important that additional longitudinal analyses involving subsequent waves of the 4-H Study be undertaken. As well, the relationships between positive and problematic trajectories should be explored in other longitudinal data sets pertinent to adolescent development. In all cases, the person-oriented (see Bergman and Magnusson 1997; Nagin 2005) approach employed in this investigation would be important to use to study changing trajectories across development. Such work will allow us to differentiate further the characteristics of the youth possessing positive and problematic pathways and will provide a more comprehensive understanding of the efforts that need to be undertaken to align individuals and contexts to maximize the possibility of PYD among diverse youth.

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