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Adolescents Occupational and Educational Goals: A Test of Reciprocal Relations

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Abstract

During adolescence, young people's future aspirations and expectations begin to crystallize, especially in the domains of education and occupation. Much of the research in this area has emphasized development within a particular domain (e.g., education) and relations between aspirations and expectations across domains remain largely unexplored, resulting in a lack of information on how goals develop in tandem and affect each other. It is also unclear whether these developmental processes differ by gender and socioeconomic status. We tested reciprocal effects between occupational and educational goals using a longitudinal sample of 636 adolescents (52% boys). Results from dynamic systems models indicated change in occupational and educational goals across high school. For all youth, occupational aspirations predicted change in occupational expectations. Educational expectations predicted change in occupational aspirations for youth in high but not low parent education groups, and occupational expectations predicted change in educational expectations for girls but not boys.

Keywords

occupation; education; aspirations; expectations; adolescence

During adolescence, young people's thoughts about their future develop and begin to crystallize, especially their educational and occupational goals. Ideas about education and the kind of career one wants are formulated during this period. Further, these goals are associated with educational and occupational attainment in adulthood (Beal & Crockett, 2010; Mello, 2008; Messersmith & Schulenberg, 2008), underscoring their potential importance for shaping the life course. While educational and occupational goals are believed to develop during adolescence (e.g., Gottfredson, 1981; Lent, Brown, & Hackett, 1994), only a few studies have examined age-related changes in either educational or occupational goals (Armstrong & Crombie, 2000; Massey, Gebhardt, & Garnefski, 2008; Mello, 2008). In addition, there has been little attention to how changing educational and occupational goals influence *each other* during this period or how gender and socioeconomic status (SES) affect these relationships. Examining these issues offers a developmentally and contextually grounded perspective on adolescents' educational and occupational goal

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setting, providing insight into how the life course is constructed both generally and by particular subgroups of youth.

Adolescents' thoughts about the future have been conceptualized in diverse ways: as future orientation (Nurmi, 1994), goals (Massey et al., 2008), possible selves (Markus & Nurius, 1986), hopes and fears (Nurmi, 1993), or aspirations and expectations (Armstrong & Crombie, 2000). Most pertinent to this paper is the concept of goals, which include cognitive representations of future outcomes and intent to affect future outcomes (Lent et al., 1994). Some researcher have further differentiated goal content (i.e., the content of a desired state or a state to avoid) and goal process (i.e., cognitions and behaviors associated with goals; Massey et al., 2008). Focusing on goal content, we examine both aspirations, defined as the things that youth would really like to do, and expectations, defined as realistic goals or what youth think they will probably do (Armstrong & Crombie, 2000; Morgan, 2007). Because this paper focuses exclusively on goal content, we use goals and goal content synonymously.

Goals for Education and Work

There are multiple factors that shape the content of occupational and educational goals, including personal preferences, perceived abilities, perceptions of prestige, and beliefs about gender roles (Gottfredson, 1981). In formulating goals, adolescents may use their understanding of the education or training needed for a given occupation (Cook et al., 1996). Although most research on goals has focused on a single domain or topical classification of goals (e.g., occupation), the domains of education and work go hand in hand during the transition to adulthood. According to developmental tasks theory (Havighurst, 1973; Nurmi, 1993), preparing for one's future education and occupation are core challenges of adolescence. Furthermore, in the U.S. and elsewhere, schooling is viewed as preparation for work, with higher levels of educational attainment permitting entry into higher status professions (Shanahan, 2000). This institutional link should lead adolescents to consider educational and occupational goals in tandem. Consistent with this notion, research has demonstrated that both occupational and educational goals are salient during this period. For example, when adolescents were asked to describe their thoughts about their future, over two-thirds reported goals related to school and work (Nurmi, 1989; 1992). Furthermore, adolescents can make predictions about the timing of adult role transitions in both domains (Nurmi, 1989), and their educational and occupational goals tend to be positively correlated (Beal & Crockett, 2010; Cook et al., 1996). These findings point to the need to examine the development of educational and occupational goals together and to determine how they are related.

Developmental Relations between Occupational and Educational Goals

To understand the co-development of occupational and educational goals, it is necessary to know both how they change across time and whether changes in one type of goal affect the other type of goal. Two perspectives on the causal relations between these goals have been proposed. One view is that occupational goals are established first and shape educational goals. Gottfredson (1981) suggests that adolescents establish occupational goals and then determine how much education they need to reach their desired occupation. Similarly, Lent and colleagues (1994) proposed that individuals first select a goal from an array of career interests and then take action toward achieving this goal through setting goals for education and training. The alternative process—that educational expectations predict occupational expectations—has also been proposed (Cook et al., 1996; Wall, Covell, & Macintyre, 1999). In this view, adolescents decide how much education they want to complete (e.g., high school) and then choose careers that are consistent with that level of training.

These alternative unidirectional models have each received empirical support. Consistent with the notion that occupational goals predict educational goals, a study of Belgian high school students showed that identifying a career in the last year of secondary school predicted greater commitment to a college education (Germeijs & Verschueren, 2007). Similarly, participating in high school programs that emphasize the importance of having an occupation contributed to increased educational attainment among high risk U.S. youth (Kemple, 2001). Conversely, other researchers found that, among urban and inner-city boys in the U.S. (Cook et al., 1996) and boys and girls in and around a small city in Canada (Wall et al., 1999), adolescents' educational aspirations and expectations predicted their occupational expectations. While intriguing, these findings on the direction of effects are inconclusive because each study examined only a subset of the possible relations. Studies using occupational expectations to predict educational expectations generally have not accounted for *previous* educational expectations, while studies using educational goals to predict occupational goals have not tested the converse effect (Lent et al., 1994). Furthermore, the analyses reported by Cook et al. (1996) and Wall et al. (1999) were based on a single time of measurement, so temporal order could not be determined. In fact, when the findings across studies are considered together, they are consistent with a *bidirectional* model in which occupational and educational goals influence each other over time. Investigating reciprocal effects requires longitudinal data that can establish temporal precedence. However, few studies of educational and occupational goals have examined relations between goals over time. Additionally, most studies of occupational and educational goals do not adequately capture the changes in goals that occur as individual adolescents develop and refine their interests and sense of self (Lent et al., 1994). Capturing these changes requires an approach that moves beyond overall associations between variables and examines how variables impact each other within an individual. In other words, the question is not only whether higher educational goals are associated with higher occupational goals but also whether individuals with higher aspirations in one domain change their aspirations correspondingly in the other domain. To our knowledge, this question has not been previously addressed.

Aspirations and Expectations

Whether occupational goals predict educational goals (or vice versa) is further complicated by the distinction between aspirations and expectations (Armstrong & Crombie, 2000; Gottfredson, 1981; Markus & Nurius, 1986). While aspirations are generally conceptualized as idealistic representations of future outcomes, expectations are considered more realistic, probable outcomes (Morgan, 2007). Consistent with this notion, there is evidence that aspirations and expectations, although related, have distinct correlates and are linked to outcomes via different pathways (Beal & Crockett, 2010). Despite the importance of the distinction between aspirations and expectations, it is not clear how these goals influence each other. Some research indicates that, over the high school years, adolescents' occupational aspirations decrease to more closely resemble their expectations in the same domain (Armstrong & Crombie, 2000), suggesting that aspirations change to fit expectations. It is also conceivable that expectations and aspirations in different domains affect each other (e.g., that educational expectations affect occupational aspirations or expectations). The second goal of this study was to examine how aspirations and expectations influence each other (within and across domains) over adolescence.

Educational and Occupational Goals among Rural Youth

The present study focused on rural youth, an important yet under-studied subgroup of adolescents. Nearly 20% of the U.S. population lives in rural areas as defined by current census designations (U.S. Census *2010 Census Urban Area FAQs*, 2010). Although

definitions of “rural” vary, typically “rural” refers to areas with relatively low population density, unincorporated areas not near metropolitan areas, and small towns, and unincorporated areas outside of but adjacent to a city (Crockett, Shanahan, & Jackson-Newsom, 2000). Yet, few studies in adolescence journals have included rural youth (Randall, Phillips, & Thompson, 2012).

Living in rural settings brings distinct challenges (e.g., low-wage, labor intensive jobs, high rates of child poverty, lack of public transportation, limited access to services; NACRHHS, 2008; O’Hare, 2009). Thus, youth in these settings often face a complex set of issues related to poverty, geographic isolation, and out-migration (for a review, see Vernon-Feagans, Cox, & Investigators, in press). Local opportunities for education and occupation are believed to shape youths’ expectations for schooling (Chenoweth & Galliher, 2004) and work (Gottfredson, 1981). Rural economies, which emphasize agriculture and extraction industries, offer a restricted range of job opportunities compared to urban or suburban areas (Crockett et al., 2000), primarily providing manual and service jobs. Perhaps because of this, rural youths are somewhat less likely than nonrural youths to expect to hold professional, technical, and managerial jobs (Cobb, McIntire, & Pratt, 1989; Haller & Virkler, 1993) and slightly more likely expect to have blue collar or lower level white collar jobs (Haller & Virkler, 1993).

Local norms and opportunities also influence educational goals. In rural areas, adult educational attainment is lower (Vernon-Feagans et al., in press) and high school drop-out rates are higher than in urban ones (Lichter, Cornwell, & Eggebeen, 1993; Swaim & Teixeira, 1991), primarily due to differences in family poverty (Lichter et al., 1993). Thus, it is not surprising that the educational goals of rural youth tend to be lower than those of non-rural youth (Haller & Virkler, 1993). Further, rural jobs usually require less education, which may affect adolescents’ educational goals. In recent decades, economic crises in rural communities have resulted in job losses, wage reductions, and fewer occupational opportunities (Conger & Elder, 1994; Elder & Conger, 2000). Under these conditions, limited economic resources and local employment opportunities may combine to constrain rural youths’ educational and occupational expectations.

Gender and SES

Both gender and SES are believed to shape adolescents’ occupational and educational goals and may influence how goals change and affect each other over time. Gottfredson (1981) argues that the occupations a person considers depend on opportunities, internalization of gender norms, and available resources; Lent et al. (1994) included gender, SES, and opportunities in the community as predictors of adolescents’ occupational goals.

Discussions of gender have typically focused on gender differences in aspirations and expectations. Historically, boys held higher educational and occupational goals than girls (Marini & Greenberger, 1978), perhaps reflecting the opportunities traditionally available for men and women (Gottfredson, 1981; Lent et al., 1994). More recent studies suggest that the gender difference has shifted, where girls expect higher educational attainment and hold higher occupational goals than boys (Rojewski, 1995); however, differences in educational expectations are not always found (Mello, 2008). More pertinent to the present study, the relationships between occupational and educational goals may also vary by gender. Adolescents develop their goals and plans in a cultural context in which women tend to assume primary responsibility for childcare even when in the work force (Schoon, 2010). Gottfredson (1981) argues that in choosing their occupation, girls in particular tend to eliminate potential occupations that they perceive to be too challenging, given gender roles and cultural norms. Further, Eccles (1994) suggests that in setting their goals (e.g., occupation), women consider their likelihood of success, as well as the potential cost

associated with a particular choice (e.g., a trade-off between work and family). Adolescent girls are aware of the need to balance adult family and career demands (Stevens, Puchtell, Ryu, & Mortimer, 1992), and this awareness could lead girls to more closely align their educational and occupational goals. Consistent with this notion, Wall and colleagues (1999) reported that among youth from a small Canadian city, girls' educational and occupational expectations were more strongly related than boys'. Gender could also affect rural adolescents' aspirations and expectations (Brown, Copeland, Costello, Erkanli, & Worthman, 2009). Because job opportunities in rural communities are often limited for women (Tickamyer & Henderson, 2003), girls' occupational and educational expectations could be more constrained, and thus more closely connected, than boys'.

Family SES is a second major determinant of adolescents' educational and occupational goals (Crockett & Beal, 2012; Schoon, 2010). In a sample of inner-city and urban youth, Cook and colleagues (1996) found that aspirations and expectations varied by SES: working-class occupations and professional athlete were common aspirations and expectations for low SES boys, while more prestigious occupations (e.g., doctor, lawyer) were more common for higher SES boys. Parental education also predicts rural adolescents' future educational and occupational goals (Crockett & Beal, 2012), perhaps because parents with college experience more often expect their children to attend college (Davis-Kean, 2005) and are better able to help them navigate the transition to college (Choy, Horn, Nunez, & Xianglei, 2000). Although SES may affect the associations between children's educational and occupational goals (Goyette, 2008), to our knowledge SES differences in the relations between educational and occupational goals have not been examined in a rural sample. Given the possible differences associated with gender and SES, it is important to examine the roles of gender and SES as possible moderators of the relations *between* educational and occupational goals among rural youth.

The Present Study

The purpose of this study was to test the bidirectional relations between occupational aspirations, occupational expectations, and educational expectations across the high school years and to explore the direction of those relations over time. Three questions framed this study: 1) Are there reciprocal relations between occupational and educational goals? 2) How do aspirations and expectations influence each other within and across domains? and 3) Do these relations vary by gender and parent education? Accounting for these complex processes requires multiple points of measurement as well as sophisticated models that can account for complex patterns of change – both between persons (i.e., intercept, slope) and within-persons. Accordingly, we used dynamic systems models (McArdle & Hamagami, 2001) to examine changes in occupational and educational goals across high school. The benefit of the dynamic systems modeling approach (also called bivariate or latent change score models) is that it estimates general associations across time and between persons (i.e., intercept and slope effects) as well as testing for within-person relations at specific time points (e.g., whether an individual's educational goals at time t predict increases in occupational goals between times t and $t+1$). These models have been used to examine reciprocal effects in development (e.g., cognitive and behavioral changes; Ferrer & McArdle, 2004; Ferrer et al., 2007; King, King, McArdle, Shalev, & Doron-LaMarca, 2009). Here we apply them to study reciprocal effects of personal goals across and within domains. To our knowledge, this is the first study to do so.

Specifically, we tested a fully bidirectional dynamic systems model, where occupational goals simultaneously predicted and were predicted by educational goals. By testing both effects in one model, we could assess the level of support for each effect (e.g., educational goal predicting change in occupational goal) in the context of the other. We also examined

gender and SES as sources of variation in these relations. Occupational goals were measured using occupational prestige scores. Based on prior research, we anticipated that SES would influence the relations between goals; specifically, we expected youth with a college-educated parent to be better equipped to use educational expectations to inform occupational goals, resulting in a stronger linkage. Because theory and prior studies (although sparse) have indicated stronger relationships between educational and occupational goals for girls than boys, we predicted that the effects of each goal on the other would be stronger for girls. These issues were examined among adolescents from a rural community that was undergoing significant economic stress.

Method

Participants

The data came from a larger longitudinal study of rural youth. The target population for the original 5-year study included all junior high students (grades 7, 8, and 9) enrolled in a rural school district in the eastern U.S. A passive parental consent process was used, which increased the representativeness of the sample: over 90% of those invited participated in the first survey. Participants were surveyed annually through 12th grade, following a cohort-sequential design. Data collection occurred between 1985 and 1991. Project personnel collected data every fall during regular school hours, using written questionnaires. Information was kept confidential, and school personnel were not involved in the data collection.

A total of 636 youth participated in the study during grades 9-12 (Grade 9 M age = 14.38, SD = .78; 48% girls). Parents' educational attainment, a marker of SES, ranged from not having completed high school to having an advanced degree; 38.8% of youth reported that their highest educated parent had completed high school or less, 17.5% of youth had a parent with some vocational training, and for 43.7% least one parent had taken some college courses. The community was mostly white (96%), and participants reflected community demographics.

Community Context

The original sample was recruited from schools serving a geographically contained rural area in the Eastern U.S. (Vicary, 1991). Although there is no single definition of "rural" (Crockett et al., 2000), several features of the study community support its designation as rural. The area was composed of small boroughs and townships located approximately 3 hours (130 miles) from the nearest major city and 45 minutes (25 miles) from the nearest urbanized area. The primary town in the district had a population of approximately 3,500 people in 1980. School census data indicated that 25% of the area's adults completed only grade school, 44% of the adults completed high school, and 7% completed college. The median annual household income was \$14,500, which was substantially lower than the median U.S. household income of \$17,710 (U.S. Bureau of the *Current Population Reports*, 1982); approximately 12% of families had incomes below the poverty level. The primary occupational categories were laborers and technical/clerical. Extracting industries (e.g., mining and lumbering) were the primary employers, although small manufacturing plants also contributed to the economy, including a cigar factory and a number of garment and textile factories. During the course of this study, the area experienced severe economic distress, with employment loss in every sector, especially mining and manufacturing (Philadelphia Inquirer, 1986). Over 45 businesses closed, and in 1987 the unemployment rate was 19.6%. Although there was heterogeneity with respect to socioeconomic status, the community as a whole was considered economically disadvantaged.

Measures

Occupational goals—Each year, participants reported their aspirations and expectations for occupations, using two open-ended questions: “What work would you like to do?” and “What kind of work do you think you will probably do?” These questions are similar to those used in other studies (Armstrong & Crombie, 2000; Mello, 2008, 2009). Occupational aspirations and expectations were coded for occupational prestige using National Opinion Research Center (NORC) codes (Davis & Smith, 2002). The use of prestige scores is common in the psychological and sociological literatures (e.g., Beal & Crockett, 2010; Chang, Chen, Greenberger, Dooley, & Heckhausen, 2006; Cook et al., 1996; Dubow, Huesmann, Boxer, Pulkkinen, & Kokko, 2006). While this approach is not always ideal, findings suggest that prestige scores, which are based on the public’s perceptions of specific occupations, generally capture both the educational requirements of a particular career and the rewards a career offers (MacKinnon & Langford, 1994). In general, careers that have higher salaries and are deemed to involve power and authority also tend to receive higher prestige scores. Thus, prestige scores allow researchers to quantify occupational aspirations and expectations in a way that accounts for the required training, the perceived authority and morality of that career, and the financial gain a career offers. Furthermore, the perceived prestige of a job is important in the formation of adolescents’ occupational goals (Gottfredson, 1981). NORC prestige scores could range from 10 (*low prestige*) to 100 (*high prestige*). Examples of jobs with a code near 30 include auctioneer (32) and sales clerk (29), and examples of occupations coded near 50 include computer programmer (51) and radio or television announcer (51). Generally, occupations coded 50 or higher would require education or training beyond high school.

Educational goals—Adolescents’ expected educational attainment was measured using the question “How far do you plan to go in school?” Response options could range from 1 (*Some high school*) to 6 (*Completing a professional degree*); this measure is consistent with other studies assessing educational expectations (Boxer, Goldstein, DeLorenzo, Savoy, & Mercado, 2011; Mello, 2008, 2009). Educational aspirations were not assessed in this study.

Socio-demographic variables—Adolescents reported their gender (girls = 0; boys = 1) and age in years. They also reported their mother’s and father’s level of education on a scale of 1 (*Grade school only*) to 7 (*Beyond college*). Responses for mother and father were averaged ($n = 475$) and used as a proxy variable for SES; if information was available for only one parent, that parent’s score was used ($n = 30$). To analyze patterns of relations within SES groups, the sample was divided into youth with at least one parent who attended some college (1; high parent education) and youth who did not have a parent with any college education (0; low parent education). Finally, cohort, based on the adolescent’s grade level at the start of the study, was included as a control in the dynamic systems models.

Data Analytic Procedures

In this study we restructured data by grade (instead of wave), and included data from grades 9 to 12. To make sure it was appropriate to pool data from the three cohorts in this way, we tested for cohort effects in all study variables at grade 12. The only significant cohort difference was in age: at grade 12, the mean age for youth in the second cohort was significantly higher than for youth in the first cohort (M difference = .13, $SE = .06$, $p = .02$).

This study involved both planned and unintended missingness. Occupational goals were not assessed until the third wave of data collection (when youth in the three cohorts were in grades 9, 10, and 11, respectively) resulting in planned missingness. Thus, data on occupational goals were available from one cohort in grade 9 ($N=204$), two in grade 10 ($N=365$), and all three in grades 11 and 12 ($N=510$ and 513 , respectively). Because data

from the first two cohorts were missing by design, it was safe to assume unbiased missingness and to use data from all three cohorts (planned missingness is assumed to be missing completely at random; Little & Rubin, 2002). To be conservative we included cohort as a control in all models. Unintentional missing data, which is typical in longitudinal research, also occurred in this study. This was not simple attrition, because a youth who missed an assessment (e.g., in grade 10) could participate in subsequent years (e.g., grade 11); thus, unintended missingness varied by grade. To address both types of missing data, Full Information Maximum Likelihood estimation (FIML; Muthen & Muthen, 1998-2012) was used. This approach uses all available data at each time point and results in less bias compared to listwise deletion (Hofer & Hoffman, 2007).

Of the 636 participants, 533 were present at all possible times of measurement. Thus, concerns with regard to attrition, or unintended missingness, apply to 16% of the sample. A comparison of age, parent education, and educational and occupational goals in grade 11 (the first time-point where planned missingness did not occur) indicated that those who were unintentionally missing at any point in the study tended to be older, $F(1, 508) = 15.79, p < .01$, have less educated parents, $F(1, 507) = 5.33, p = .02$, and anticipate lower educational attainment, $F(1, 504) = 12.34, p < .01$, compared to youth who were present for all possible times of measurement. No other differences were found. Similar differences between groups with and without unintended missing data were observed at grade 12.

Preliminary analyses were conducted to examine univariate and bivariate statistics and to test for differences by gender and parent education in each of the goals. Ordered categorical variables with more than 5 levels (e.g., educational expectations) and where ceiling effects were not observed were treated as continuous (Ferrando, 1999). The primary analyses involved dynamic systems models (McArdle & Hamagami, 2001). Dynamic systems models, an extension of parallel growth curve models, use structural equation modeling (SEM) to assess the direction of relations between two variables (e.g., occupational aspirations and expectations). These models yield two pieces of information. They allow for a test of the overall relationship between two trajectories (i.e., the relations among the latent intercepts and slopes of two variables). In addition, these models test the cross-lagged effects of one variable (e.g., occupational expectations at grade 9) on latent change in the other variable (e.g., change in educational expectations from grade 9 to 10), and the reverse effect. This allows for an explicit test of the directional effect within individuals. In this way, multiple potential pathways between aspirations and expectations are tested at once, and the relative strength of one path in the presence of other paths is accounted for. Due to the nature of dynamic systems models, only bivariate reciprocal relations can be estimated. Thus, separate models were estimated for the relations between occupational aspirations and educational expectations, occupational expectations and educational expectations, and occupational aspirations and occupational expectations, respectively. Further, testing latent variable interactions (e.g., between gender and the latent slope) was not possible because of limited degrees of freedom. Therefore, models for each pair of goals (e.g., educational expectations and occupational aspirations) were estimated first for the entire sample and then separately by gender and parent education group (youth with at least one parent who attended some college = 1; high youth who did not have a parent with any college education = 0) to capture variability in the relations between educational and occupational goals for boys and girls and for youth with more educated and less educated parents. For all models, the requirement that autoregressive relations across times of measurement be held to equivalent was lifted, so that we could detect increases or decreases in the strength of these reciprocal relations over time, rather than assuming effects were stable.

Model fit was assessed using a combination of fit indices: chi square significance tests and values for CFI, RMSEA, and SRMR. Because chi square tests are dependent on sample size,

and can therefore be biased with larger or smaller samples, chi-square significance is not the primary fit statistic considered when evaluating good fit (Kline, 2005). Instead, a model is considered to have good fit when the CFI value is at or above .95, the RMSEA value is at or below .06, and the SRMR is at or below .08 (Hu & Bentler, 1998).

Results

Preliminary Analyses

Results of univariate and bivariate analyses are provided in Table 1. The means for occupational aspirations and expectations of participants reflect careers that, on average, will require either some technical training or a degree beyond high school. Similarly, the mean for educational expectations aligns with completing technical training or some college. There was some variability in occupational and educational goals across high school: in grade 9, 32.2% of girls and 29.4% of boys expected not to pursue education after high school, but by grade 12, only 11.7% of girls and 15.1% of boys expected to complete no further training. Similarly, in grade 9, 42.5% of girls and 40.3% of boys expected to finish a 4-year college degree or beyond, but by grade 12, 49% of girls and 45.8% of boys held those expectations.

Correlations among aspirations and expectations were significant at each time point (r s ranged from .31 to .66, $ps < .05$). There was some stability across time in each goal, where bivariate correlations between adjacent grades (e.g., grades 9 and 10) ranged from .28 to .48 for occupational aspirations, .22 to .35 for occupational expectations, and .60 to .66 for educational expectations ($ps < .01$). Analysis of variance was used to test for significant gender differences in parent education, age, occupational aspirations and expectations, and educational expectations. The only significant difference was in educational expectations, where girls expected to complete significantly more education than boys ($F(1, 437) = 4.65$, $p = .03$). We also examined differences in SES for age and goals; there were significant differences for all goals ($p < .05$) with high SES youth holding higher educational expectations ($F(1, 512) = 36.09$), occupational expectations ($F(1, 464) = 3.85$), and occupational aspirations ($F(1, 479) = 4.26$) in grade 12. Changes in goals were examined as part of the dynamic systems models reported below. There were general increases in occupational and educational goals across grades 9 to 12.

To establish the predictive validity of occupational and educational goals in this sample, we examined the correlations between participants' grade 12 aspirations/expectations and reported engagement in academic and vocational activities in grade 12 as well as their educational attainment in young adulthood (see AUTHOR CITE for similar findings). Educational expectations in grade 12 were significantly associated with grade point average and time spent in academic activities, as well as with adult educational attainment (r s range from .45 to .67, $ps < .01$). Occupational aspirations and expectations were significantly associated with these same variables (r s range from .14 to .25, $ps < .01$) and also with grade 12 vocational activities, such that adolescents with higher aspirations and expectations reported spending less time working in grade 12 ($r = -.13$ and $-.12$, respectively, $ps < .01$).

Reciprocal Relations between Occupational and Educational Goals

Occupational aspirations and educational expectations—The model examining reciprocal relations between occupational aspirations and educational expectations in the full sample had good fit, $\chi^2(31) = 36.31$, $p = .23$, CFI = .99, RMSEA = .02, SRMR = .07 (see Table 2). This model included the effects of cohort, gender, and parent education on the intercepts and slopes of occupational and educational goals. Regarding the overall trajectories, there was a significant effect of parent education on the intercepts of

occupational aspirations and educational expectations, with higher parent education associated with higher adolescent goals. Parent education also predicted the slope of educational expectations, such that higher levels of parental education were associated with greater increases in expectations. The effects of cohort and gender on intercepts and slopes of goals were non-significant. The correlation between the intercepts for occupational aspirations and educational expectations was significant and positive; however, the slopes were not significantly correlated, and the intercept for occupational goals did not predict the slope for educational goals. The reverse relationship between the intercept for educational goals and the slope for occupational goals was also not significant.

Most relevant to our research questions, the cross-lagged results, which examine within-person effects of educational expectations on change in occupational aspirations and the reverse, indicated that higher educational expectations at each grade level predicted increases in occupational aspirations over the subsequent year. For example, grade 9 educational expectations significantly predicted increases in occupational aspirations between grades 9 and 10, and this pattern of relations persisted across high school (i.e., educational expectations in grade 10 predicted increases in occupational aspirations between grade 10 and 11, and so forth). In contrast, the reverse relation (i.e., aspirations predicting change in expectations) was not significant at any grade. Thus, educational expectations consistently predicted subsequent change in occupational aspirations throughout high school, whereas occupational aspirations did not predict change in educational expectations, consistent with a unidirectional effect.

Occupational and educational expectations—The model estimating reciprocal relations between occupational expectations and educational expectations for the full sample had good fit ($\chi^2(31) = 32.36, p = .40, CFI = .99, RMSEA = .01, SRMR = .06$; see Table 3), controlling for the effects of cohort, gender, and parent education on the intercept and slope of both expectations. Results indicated significant positive relations between parent education and the intercepts for occupational and educational expectations, increases in parent education were associated with increases in educational and occupational goals. Gender and cohort were not significantly correlated with intercepts or slopes for goals. Intercepts for occupational and educational expectations were significantly correlated but slopes were not, and cross-domain intercepts and slopes were not significantly related to each other. Cross-lagged effects indicated no significant relations between occupational and educational expectations.

Reciprocal Relations between Occupational Aspirations and Expectations

The model estimating reciprocal relations between occupational aspirations and expectations had good fit ($\chi^2(31) = 47.67, p = .03, CFI = .98, RMSEA = .03, SRMR = .06$; see Table 4, Figure 1), controlling for the effects of cohort, gender, and parent education on the intercepts and slopes of both occupational goals. Parent education was significantly and positively related to the intercepts for both goals but not the slopes. Gender and cohort were not significantly related to any intercepts or slopes. The intercepts and slopes of the two goals were significantly and positively correlated. Cross-domain intercepts and slopes were not significantly associated. However, the cross-lagged results indicated that occupational aspirations in grades 9, 10, and 11 significantly predicted increases in occupational expectations over the following year. Relations in the opposite direction (i.e., occupational expectations predicting change in aspirations) were not significant, consistent with a unidirectional model.

Effects of Gender and Parent Education

Variations by gender—When the three models were estimated separately by gender, only the results for occupational and educational expectations differed for boys and girls (see Figure 2, Table 3). For boys, model fit was good, $\chi^2(27) = 29.55$, $p = .33$, CFI = .99, RMSEA = .02, SRMR = .09, and intercepts for occupational and educational expectations were positively correlated but no cross-lagged reciprocal effects were significant, consistent with the results for the full sample. However, for girls, model fit was good, $\chi^2(27) = 38.74$, $p = .07$, CFI = .97, RMSEA = .04, SRMR = .10, and occupational expectations in grades 9, 10, and 11 significantly predicted greater increases in educational expectations over the following year. In contrast, educational expectations did not predict subsequent changes in occupational expectations.

Variations by parent education—The three models were estimated separately for youth with parents that were more educated (where at least one parent who had some college experience) and youth with less educated parents (where neither parent attended college). Results for the two groups differed only for the model examining occupational aspirations and educational expectations (see Figure 3, Table 1). For the low parent education group, model fit was good, $\chi^2(27) = 18.14$, $p = .90$, CFI = .99, RMSEA = .01, SRMR = .04, but there were no significant cross-lagged relations between occupational aspirations and educational expectations. For the high parent education group, model fit was good, $\chi^2(27) = 41.15$, $p = .04$, CFI = .97, RMSEA = .04, SRMR = .10; furthermore, as with the full sample, educational expectations consistently and positively predicted change in occupational aspirations across high school in this group, but occupational aspirations did not predict change in educational expectations.

Discussion

The purpose of this study was to examine how adolescents' goals in occupational and educational domains develop in tandem across the high school years and whether educational goals appear to drive changes in occupational goals or vice versa within individuals. The results from dynamic systems models indicated that overall occupational aspirations, occupational expectations, and educational expectations are related to each other across the high school years. Furthermore, within individuals, levels of each goal predicted changes in another goal over the next year. Although we tested a bidirectional model for each pair of goals, only unidirectional effects were supported. Within the occupational domain, aspirations predicted change in expectations regardless of gender or parent educational attainment. With regard to the relations between occupational and educational goals, educational expectations predicted subsequent changes in occupational aspirations primarily for youth with at least one parent who attended college. Occupational expectations predicted change in educational expectations for girls but not boys. Thus, the specific relations between occupational and educational goals depended on gender and parental education as well as whether aspirations or expectations were assessed.

These findings indicate greater complexity in the relations between goals than has previously been suggested in the developmental literature. Rather than a consistent unidirectional process where occupational goals predict educational goals (e.g., Gottfredson, 1981; Lent et al., 1994) or educational goals predict occupational goals (e.g., Cook et al., 1996; Wall et al., 1999), our findings indicate complex pathways, where both domain and type of goal (i.e., aspiration, expectation) must be considered. Furthermore, our results speak to the importance of gender and parent education in shaping the relations between occupational and educational goals; such moderating effects have not previously been considered in the theoretical or empirical literature.

The results for educational expectations and occupational aspirations indicated that, within individuals, educational expectations predicted changes in occupational aspirations, consistent with the notion that adolescents use their educational goals to inform occupational choice. This stands in contrast to Gottfredson (1981) and Lent and colleagues (1994), who proposed that occupational goals would predict educational goals. Specifically, our results indicated that adolescents with higher educational expectations subsequently showed greater increases in occupational aspirations than youth who planned to pursue less education. This pattern is logical, because higher levels of education allow entry into high status professions, and educational attainment is a strong predictor of occupational status (Schoon, 2009). Importantly, when the sample was divided by parent educational level, the finding was only significant for youth with at least one parent who attended college. This suggests that youth with college-educated parents (but not other youth) are likely to adjust their occupational goals (i.e., job prestige) in line with their educational goals. It may be that parents with college experience are able to provide their children with more details about the kinds of occupations available for those with a college degree, and this knowledge allows adolescents to create a better correspondence between educational and occupational goals. It is noteworthy that Cook et al. (1996) and Wall et al. (1999) also identified significant associations between educational expectations and occupational goals in their samples of inner city and urban youth; our longitudinal findings extend their cross-sectional results by showing that, in a rural sample, educational expectations predict change in occupational aspirations primarily among youth with more educated parents.

When within-person effects of occupational expectations and educational expectations were examined, an impact of occupational expectations on change in educational expectations was found only for girls. Thus, there was evidence that girls, but not boys, gradually calibrate their educational goals to be more congruent with their anticipated occupational role. This difference could reflect gender-role factors, particularly the contingencies that operate in the adult life course, where work and family roles are more interdependent for women (Schoon, 2010). Given this interdependence, some girls may aim for less lofty careers in order to balance their work and family roles, and may adjust their educational goals accordingly. Further, because women tend to marry and have children earlier than men (Simmons & Dye, 2004), they may have fewer post high school years in which to achieve occupational and educational goals prior to family formation, creating a need for efficient educational choices. Additionally, girls in our sample reported higher educational expectations than boys, consistent with research on rural youth from the last three decades (e.g., Chenoweth & Galliher, 2004; Elder & Conger, 2000). Because occupational opportunities for women are limited in rural areas, especially for those without a college education (Tickamyer & Henderson, 2003), girls who plan to pursue high status occupations must also earn the necessary educational credentials.

Within the occupational domain, aspirations predicted changes in expectations in the sample as a whole. Youth with higher occupational aspirations showed greater increases in their occupational expectations across grades 9 to 12. This pattern is consistent with models from Gottfredson (1981) and Lent et al. (1994), who proposed that adolescents start with an array of career aspirations and later select the career they are most likely to pursue. Notably, this effect was observed even though Gottfredson focused on the content of occupational goals, whereas we measured occupational prestige. Furthermore, this effect was found for boys and girls and for adolescents with more and less educated parents. Our findings complement those in previous studies (Armstrong & Crombie, 2000), where adolescents who initially had higher occupational aspirations experienced greater increases in occupational expectations (defined as the occupational choice they viewed as most likely). Taken together, the current and previous findings document a robust effect of occupational aspirations on occupational expectations during the high school years.

In terms of developmental process, the longitudinal relations between educational and occupational goals uncovered in this study indicated that many adolescents use knowledge about their future identities in one domain (e.g., education) in forming and refining their goals in other domains (e.g., occupation). It is also worth noting that the strength of relations between goals increased across the high school years, indicating that the coupling of goals becomes stronger as youth approach the transition out of high school. The associations we observed between goals in distinct domains underscore the need to examine multiple domains simultaneously during adolescence, rather than focusing on change within a single domain. This finding has important implications for adolescent development – our results indicate that goal-setting may be linear in nature, at least during middle adolescence, where youth identify one goal (e.g., education) and then modify subsequent goals in occupation. This highlights the importance of intervening on the construct that drives change, to ensure an impact of both educational and occupational goals.

The present findings extend current theoretical perspectives on the development of adolescents' goals in several important ways. First, although we tested for bidirectional effects based on integration of previous theories (Cook et al., 1996; Gottfredson, 1981; Lent et al., 1994; Wall et al., 1999), it does not appear to be the case that occupational goals consistently drive educational goals or that educational goals consistently drive occupational goals. Although unidirectional effects were found for each pair of goals, the direction of the influence differed in each case. For example, educational expectations predicted occupational aspirations, and, for girls, occupational expectations informed educational expectations. Second, within the occupational domain, occupational aspirations predicted occupational expectations for youth in general, consistent with Gottfredson (1981). These findings indicate that the distinction between expectations and aspirations may be important in determining the direction of influence and needs to be incorporated in future theory and research on how goals affect each other. Furthermore, the results differed by gender and parent educational attainment, underscoring the need to consider adolescents' goals as being constructed in the context of gender norms and social class. This requires going beyond the recognition that gender and SES might predict expectations and aspirations (e.g., Gottfredson, 1981; Lent et al., 1994), to how gender and SES might shape the ways in which particular goals affect each other over time.

Our findings have implications for interventions. Historically, interventions have focused on either occupation or education, but rarely on both (Lent et al., 1994). The evidence that adolescents consider multiple domains simultaneously speaks to the importance of addressing multiple domains within an intervention. Furthermore, the different patterns of relations between educational and occupational goals by gender and parent education suggest a need to tailor interventions to specific populations. For example, an intervention targeting occupational expectations might be expected to have an impact on educational goals for girls, but not necessarily for boys. Likewise, interventions that focus on educational expectations might foster a change in occupational aspirations for youth who have parents with college experience but perhaps not for other youth. Based on these differences, boys with less educated parents may be a group at risk for disconnect between educational and occupational goals. While we did not have a large enough sample to examine these youth specifically, they may be an important group to consider in future research. Finally, our finding that associations between goals in different domains across domains were already observed by 9th grade may indicate the importance of providing interventions about potential education and career options for youth by the beginning of high school, if not sooner.

Limitations and Future Directions

Although the study employed longitudinal data across four grade levels, several limitations should be considered. The sample was European-American and from a rural area, potentially limiting the generalizability of findings to other populations. In future studies it would be desirable to replicate these findings in more ethnically diverse samples and in urban contexts. Further, occupational aspirations and expectations were coded in terms of occupational prestige. While this provides a continuous measure, the specific qualities of the occupations adolescents reported were not retained. Future research should explore the relations between educational goals and more qualitative aspects of career choice (e.g., occupational categories). Furthermore, prestige scores may reflect a more individualistic social orientation and materialistic values, which could be at odds with rural norms (Elder & Conger, 2000). It is also unfortunate that we do not have a measure of educational aspirations; more inclusive measures of educational goals would be valuable. An additional limitation of the measures is that we do not know exactly how adolescents interpreted our questions on goals (e.g., whether “like to do” really captured aspirations) – qualitative data could be used to uncover any bias related to how questions were perceived. Finally, although we tested longitudinal relations between expectations and aspirations in the most rigorous way possible with our data, it is still possible that a third unmeasured factor (e.g., planfulness) is responsible for the associations. Future studies might examine planfulness and include other domains (e.g., expectations regarding family life) in the analysis to extend our understanding of how adolescents’ goals in different domains influence one another across development.

Conclusions

To our knowledge, the present study is the first to examine the dynamic interplay among educational and occupational goals during adolescence, when these goals begin to crystallize. The findings indicate that adolescents have occupational aspirations that appear to inform their occupational expectations. For youth with at least one parent who attended college educational expectations also predicted occupational aspirations, and, for girls, occupational expectations informed educational expectations. The findings underscore the need for theoretical models of future orientation that consider the development and coordination of multiple life goals during adolescence as well as the role of gender and socioeconomic context in shaping these processes.

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Highlights

- Adolescent future-oriented cognitions in occupation and education are related
- Educational expectations predict change in subsequent occupational plans for higher SES youth
- For girls, educational expectations are also shaped by occupational plans

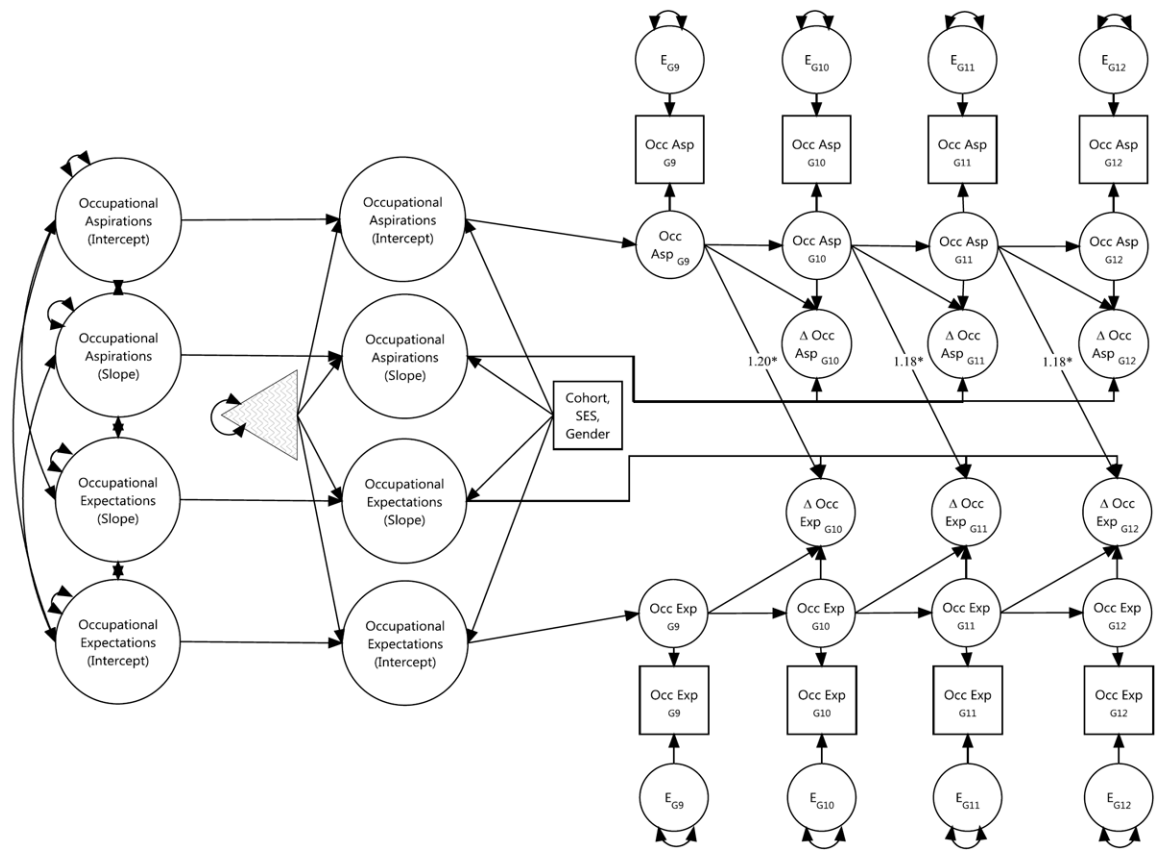


Figure 1. Occupational Aspirations and Occupational Expectations for the Full Sample. * $p < .05$, ** $p < .01$. All effect coefficients are unstandardized. Standardized and unstandardized coefficients for all paths are provided in Table 4.

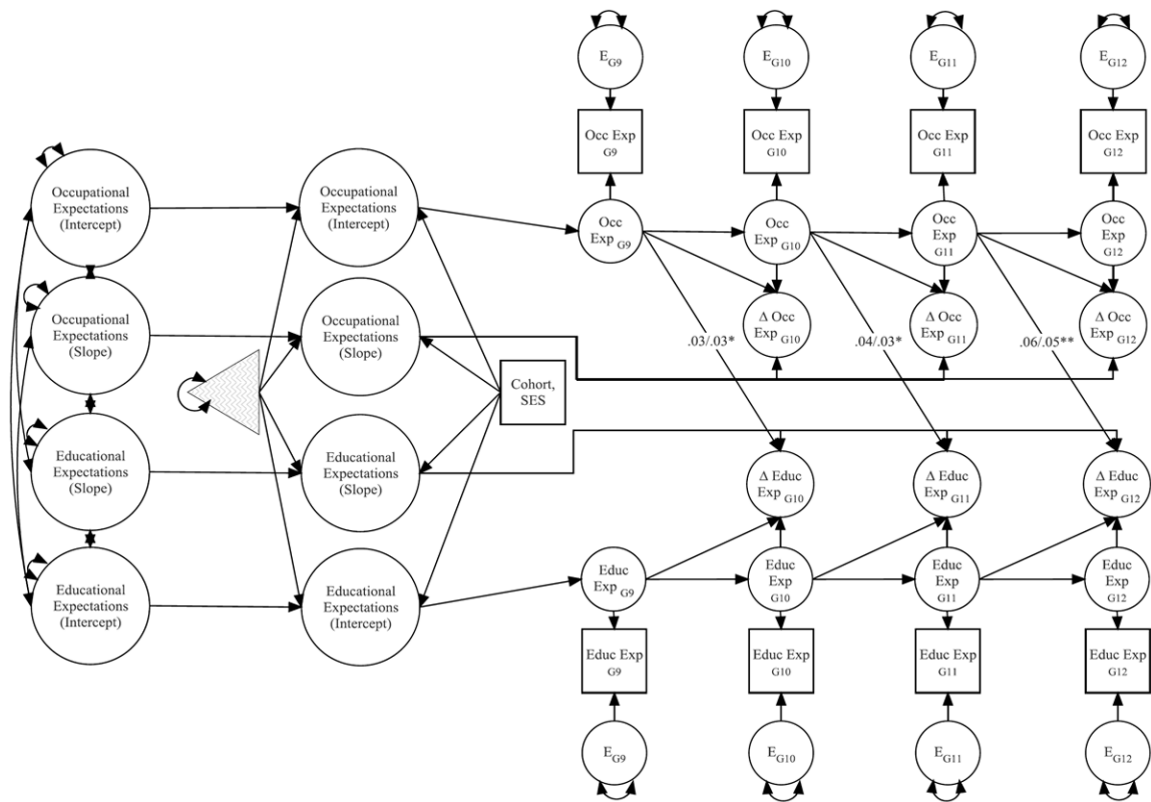


Figure 2.

Occupational Expectations and Educational Expectations for Boys and Girls (Boys/Girls). * $p < .05$, ** $p < .01$. All effect coefficients are unstandardized. Standardized coefficients for all paths are provided in Table 3.

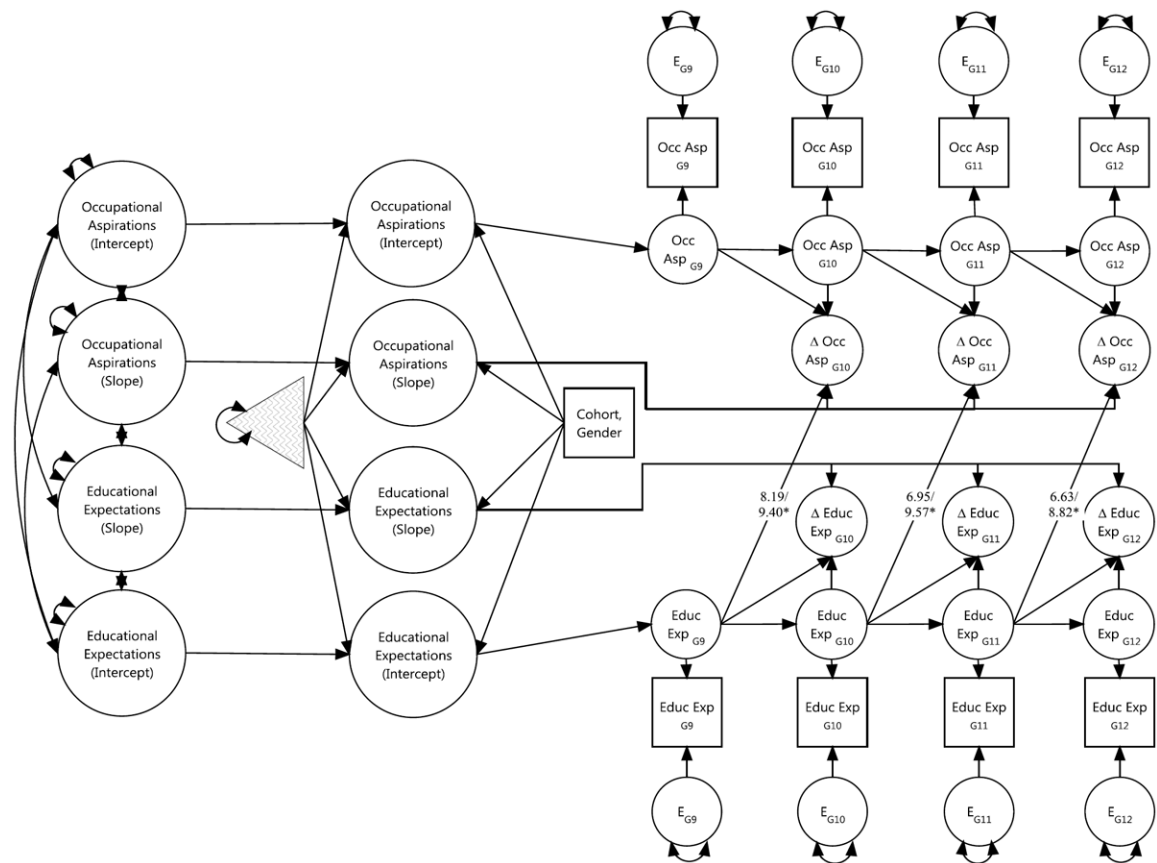


Figure 3.

Occupational Aspirations and Educational Expectations for SES group (Parent without some college/Parent with some college education). * $p < .05$, ** $p < .01$. All effect coefficients are unstandardized. Effect coefficients for all paths are provided in Table 2.

Table 1
Univariate and bivariate statistics for grade 12 variables by gender (boys in top right, girls in bottom left of table)

	1	2	3	4	5	6
1. Age	-	.00	-.26**	.16*	-.11	-.22**
2. Parent Education	-.03	-	.01	.09	.03	.24**
3. Cohort	.04	.03	-	.12	.16*	.03
4. Occupational Aspirations	.10	.10	.01	-	.62**	.36**
5. Occupational Expectations	.02	.13	.00	.72**	-	.28**
6. Educational Expectations	-.24**	.37**	-.01	.26**	.33**	-
Mean (SD) for boys	17.20 (0.53)	3.00 (1.20)	0.87 (0.79)	52.34 (15.15)	53.62 (16.23)	3.91 (1.26)
N for boys	225	284	263	205	197	225
Mean (SD) for girls	17.11 (0.50)	2.88 (1.27)	1.00 (0.81)	52.32 (13.56)	53.31 (14.17)	4.16 (1.23)
N for girls	214	267	252	204	201	214

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

Table 2

Standardized Effects of Dynamic Models between Occupational Aspirations and Educational Expectations for the Full Sample and by Socio-Economic Status Group

Effect	β Full Sample	β Low Parent Educ.	β High Parent Educ.
Grade 9 OA predicting Δ EE grade 9 to grade 10	-0.73	-1.19	-0.61
Grade 9 EE predicting Δ EE grade 9 to grade 10	-1.18	-0.25	2.62
Grade 10 OA predicting Δ EE grade 10 to grade 11	-1.65	-1.41	-1.28
Grade 10 EE predicting Δ EE grade 10 to grade 11	-2.73	-0.27	4.82
Grade 11 OA predicting Δ EE grade 11 to grade 12	-0.59	-2.07	-3.67
Grade 11 EE predicting Δ EE grade 11 to grade 12	-1.22	-0.40	3.43 *
Grade 9 EE predicting Δ OA grade 9 to grade 10	1.10 *	2.57	1.04 *
Grade 9 OA predicting Δ OA grade 9 to grade 10	-2.75 *	-1.12	1.28 *
Grade 10 EE predicting Δ OA grade 10 to grade 11	2.42 *	2.20	2.62 *
Grade 10 OA predicting Δ OA grade 10 to grade 11	-3.63 *	-0.99	3.79 *
Grade 11 EE predicting Δ OA grade 11 to grade 12	3.79 *	1.88	2.91 *
Grade 11 OA predicting Δ OA grade 11 to grade 12	-5.68	-0.78	4.63 *
Cohort Predicting OA Intercept	0.09	0.37	-0.10
Cohort Predicting OA Slope	0.19	-0.01	0.01
Cohort Predicting EE Intercept	-0.17	-0.09	0.14
Cohort Predicting EE Slope	0.16	0.58	-0.04
Parent Education Predicting OA Intercept	0.24 **	---	---
Parent Education Predicting OA Slope	-0.16	---	---
Parent Education Predicting EE Intercept	0.30 **	---	---
Parent Education Predicting EE Slope	0.37 **	---	---
Gender Predicting OA Intercept	-0.10	-0.07	-0.06
Gender Predicting OA Slope	-0.06	0.04	-0.11
Gender Predicting EE Intercept	0.01	-0.02	0.04
Gender Predicting EE Slope	-0.11	-0.04	0.06
OA Intercept with EE Intercept	0.67 **	0.45 **	0.87 **
OA Intercept with EE Slope	0.51	0.59	-0.99 **
EE Intercept with OA Slope	0.06	-0.99 **	0.86 **

* $p < .05$,

** $p < .01$;

OA = Occupational Aspirations, EE = Educational Expectations

Table 3

Standardized Effects of Dynamic Models between Occupational Expectations and Educational Expectations for the Full Sample and Separately by Gender

Effect	β Full Sample	β Girls	β Boys
Grade 9 OE predicting Δ EE grade 9 to grade 10	-2.01	0.46 *	-0.22
Grade 9 EE predicting Δ EE grade 9 to grade 10	0.90	-0.98 **	-1.91 **
Grade 10 OE predicting Δ EE grade 10 to grade 11	-5.33	0.61 **	-0.23
Grade 10 EE predicting Δ EE grade 10 to grade 11	2.95	-1.64 *	-1.91 **
Grade 11 OE predicting Δ EE grade 11 to grade 12	-5.33	1.07 **	-0.23
Grade 11 EE predicting Δ EE grade 11 to grade 12	2.95	-1.57 *	-1.91 **
Grade 9 EE predicting Δ OE grade 9 to grade 10	0.29	-0.16	1.99
Grade 9 OE predicting Δ OE grade 9 to grade 10	-1.48	-1.26 **	-0.64
Grade 10 EE predicting Δ OE grade 10 to grade 11	0.86	-0.39	2.38
Grade 10 OE predicting Δ OE grade 10 to grade 11	-3.31	-2.25 *	-0.64
Grade 11 EE predicting Δ OE grade 11 to grade 12	2.39	-0.26	2.55
Grade 11 OE predicting Δ OE grade 11 to grade 12	-10.33	-1.50 *	-0.64
Cohort Predicting OE Intercept	-0.40	-0.64	0.32
Cohort Predicting OE Slope	0.21	0.09	0.17
Cohort Predicting EE Intercept	-0.33	-0.57	-0.01
Cohort Predicting EE Slope	0.13	0.10	0.14
Parent Education Predicting OE Intercept	0.21 *	0.07	0.10
Parent Education Predicting OE Slope	0.11	0.18	0.02
Parent Education Predicting EE Intercept	0.30 **	0.21	0.37 **
Parent Education Predicting EE Slope	0.04	0.29	0.24 **
Gender Predicting OE Intercept	-0.03	---	---
Gender Predicting OE Slope	-0.01	---	---
Gender Predicting EE Intercept	0.01	---	---
Gender Predicting EE Slope	-0.07	---	---
OE Intercept with EE Intercept	0.61 **	0.67 **	0.73 **
OE Intercept with EE Slope	0.71	0.66	0.86 **
EE Intercept with OE Slope	0.44	0.35	0.34

* $p < .05$,

** $p < .01$;

OE = Occupational Expectations, EE = Educational Expectations

Table 4

Unstandardized and Standardized Effects of Dynamic Models between Occupational Aspirations and Occupational Expectations for the Full Sample

Effect	Estimate	SE	β
Grade 9 OA predicting Δ OE grade 9 to grade 10	1.20 [*]	0.65	1.23
Grade 9 OE predicting Δ OE grade 9 to grade 10	-1.37 ^{**}	0.40	-1.57
Grade 10 OA predicting Δ OE grade 10 to grade 11	1.18 [*]	0.64	5.33
Grade 10 OE predicting Δ OE grade 10 to grade 11	-1.37 ^{**}	0.40	-5.64
Grade 11 OA predicting Δ OE grade 11 to grade 12	1.18 [*]	0.64	3.26
Grade 11 OE predicting Δ OE grade 11 to grade 12	-1.37 ^{**}	0.40	-3.97
Grade 9 OE predicting Δ OA grade 9 to grade 10	-0.64	0.50	-1.96
Grade 9 OA predicting Δ OA grade 9 to grade 10	0.72	0.77	2.01
Grade 10 OE predicting Δ OA grade 10 to grade 11	-0.67	0.50	-1.93
Grade 10 OA predicting Δ OA grade 10 to grade 11	0.72	0.77	2.29
Grade 11 OE predicting Δ OA grade 11 to grade 12	-0.69	0.51	-1.44
Grade 11 OA predicting Δ OA grade 11 to grade 12	0.72	0.77	1.44
Cohort Predicting OA Intercept	-1.92	2.54	-0.13
Cohort Predicting OA Slope	1.02	1.06	0.14
Cohort Predicting OE Intercept	-3.52	6.25	-0.21
Cohort Predicting OE Slope	1.37	1.01	0.18
Parent Education Predicting OA Intercept	1.93 [*]	0.76	0.20
Parent Education Predicting OA Slope	-0.51	0.98	-0.11
Parent Education Predicting OE Intercept	2.15 [*]	1.05	0.20
Parent Education Predicting OE Slope	-0.30	0.88	-0.06
Gender Predicting OA Intercept	-2.20	1.82	-0.10
Gender Predicting OA Slope	1.81	1.71	0.16
Gender Predicting OE Intercept	0.19	2.73	0.01
Gender Predicting OE Slope	1.58	1.65	0.13
OA Intercept with OE Intercept	111.37 ^{**}	27.52	0.75
OA Intercept with OE Slope	-27.20	52.53	-0.39
OE Intercept with OA Slope	-13.10	55.47	-0.18

^{*}
 $p < .05$,

^{**}
 $p < .01$;

OA = Occupational Aspirations, OE = Occupational Expectations