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Longitudinal Associations Between Gender-typed Skills and Interests and Their Links to Occupational Outcomes

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Abstract

Although gender-based occupational segregation has declined in past decades, the world of work remains segregated by gender. Grounded in research showing that individuals tend to choose jobs that match their interests and skills, this study examined the longitudinal associations between gendered activity interests and skills from middle childhood through adolescence and tested gendered interests and skills, measured in adolescence, as predictors of occupational outcomes in young adulthood. Data were collected from 402 participants at four time points—when they averaged 10, 12, 16, and 25 years old. Results revealed that the longitudinal linkages between male-typed interests and skills were bidirectional, that both male-typed interests and skills in adolescence predicted working in male-typed occupations in young adulthood, and that skills, but not interests, predicted income. In contrast, female-typed interests predicted female-typed skills, but not the reverse, adolescent female-typed skills (but not interests) predicted working in female-typed occupations in young adulthood, and there were no links between female-typed interests or skills and income. Discussion focuses on the differential meanings and developmental implications of male-versus female-typed interests and skills.

Keywords

gendered interests; gendered skills; occupational outcomes; middle childhood; adolescence; young adulthood

Although past decades have witnessed a decline in occupational segregation, the world of work remains segregated by gender (Blau, Brummund, & Liu, 2013). In the US, for example, more women work in service-type careers such as healthcare or teaching, whereas more men work in managerial or physically-demanding jobs (Hegewisch & Matite, 2013).

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Given that individuals tend to choose jobs that match their interests and skills (Dawis & Lofquist, 1984), investigation of gendered interests and skills in childhood and adolescence may provide insights about processes underlying gendered occupational segregation. Recent research documents that youths' interests and skills develop in relation to each other, and so an important step toward understanding their role in occupational choice is to chart their interplay across childhood and adolescence. Accordingly, in this study we examined the longitudinal links between gendered interests and skills from middle childhood through middle adolescence and tested whether interests and skills in middle adolescence predicted occupational outcomes—specifically, the gender-typing of jobs and income—in young adulthood. Given the possibility of gender differences in career development, we also examined gender as a moderator of these linkages.

Gender and Occupational Outcomes

Policymakers have targeted the gendered nature of occupational achievement for its negative impact on individuals, work organizations, and society at large. Constrained opportunities—real or perceived—may limit individuals' feelings of accomplishment that might derive from gender atypical occupations, reduce the number of skilled job applicants and workers within an industry, and contribute to the gender wage gap and gender differences in power and influence at all levels of a society (Hegewisch et al., 2010). Accordingly, researchers have explored processes that may underlie gendered occupational segregation. Most work has focused on why women are less likely to pursue male-typed occupations in the science, technology, engineering, and math (STEM) fields. We know little, however, about why men fail to pursue female-typed occupations. Male-typed occupations have long paid higher salaries than female-typed occupations, but the past two decades have seen declines in job growth and wages of blue-collar, male-typed jobs (McCall, 2001); further, such jobs are often more dangerous than female-typed jobs (Padavic & Reskin, 2002). Thus, it is important to understand the underpinnings of gendered occupational choices of *both* men and women.

Sociocultural and psychological processes are thought to underlie gendered occupation segregation. Gottfredson's (1981) circumscription and compromise theory asserts that, by 6 to 8 years of age, children narrow their occupational aspirations based on their attitudes about gender-appropriate occupations. Betz and Fitzgerald (1987) argued that decision making about career choices differs for women and men because of women's shorter history of labor force participation and because of their family roles. Other scholars have posited that interpersonal relationships are more influential in women's than in men's occupational choices. For example, Mainiero and Sullivan's (2005) kaleidoscope model asserts that women consider the needs of family, friends and coworkers in their career decisions, whereas men more often make decisions with the goal of career advancement. Accordingly, men and women seek different occupations. Studies testing these models highlight gender differences, and thus, we also test whether these developmental processes differ for boys and girls.

In the career development literature, individuals' interests and skills have long been regarded as critical factors in occupational choices (Holland, 1959; Lent, Brown, & Hackett, 1994).

Individuals tend to choose careers that fit their interests, and such patterns are evident across a variety of occupations (Schmitt-Rodermund, 2004; Tracey & Hopkins, 2001). Moreover, self-assessed abilities are linked with school grades and perceived career options in adolescence (Zimmerman, Bandura, Martinez-Pons, 1992), occupational choices among high school seniors (Tracey & Hopkins, 2001), and salary and status among adult professionals (Abele & Spurk, 2009). This study built on prior research that examined targeted sets of interests and skills aligned with specific occupations (e.g., asking engineering students about how much they liked “solving computer software problems”). With a broader focus on gendered qualities and outcomes, we asked whether individuals with greater male-typed and female-typed interests and skills were more likely to choose male and female-typed occupations, respectively. Specifically, we assessed youths' ratings of their interests and skills in a range of activities and their interrelationships over time and tested whether these were linked to gendered occupational outcomes in young adulthood.

The Role of Gender-Typed Interests and Skills in Occupational Outcomes

A body of work on the implications of skills and interests for achievement in task domains ranging from academics to sports is grounded in the expectancy-value model (Wigfield & Eccles, 2000). This model holds that achievement and achievement-related choices can be explained by one's belief in the ability to succeed and how one values the task. In this model, skills predict interests and expectancies, which in turn predict outcomes, and skills predict outcomes via interests or expectancies. We built on this work to study the role of gender-typed skills and interests in gendered occupational outcomes. Gender is multi-faceted, including attitudes, preferences, and identity, and the course of development varies across domains (Ruble, Martin & Berenbaum, 2006). Research on gender development reveals, however, that sex differences in interests are some of the earliest to emerge (Ruble et al., 2006). In addition, studies of time use reveal that, across childhood and early adolescence, sex differences are evident in a wide range of daily activities in and beyond the academic domain (Ruble et al., 2006). Thus, to understand the precursors of gendered occupational choices, we focused on youths' gendered skills and interests in activities ranging from academics to leisure.

Prior studies suggest that gender-typed interests and skills may be related to gendered occupational outcomes. For example, gendered interests and skills were associated with gendered occupational aspirations in childhood (Etaugh & Liss, 1992). We know less, however, about the links between youths' gendered interests and skills and actual occupational outcomes in adulthood. Using retrospective data, Cooper and Robinson (1989) found that gender-typed childhood interests were associated with gendered occupational aspirations in college students, and one study found links between math and verbal skills in twelfth grade and occupational choices in the STEM field when individuals were 33 years old (Wang, Eccles, & Kenny, 2013). Acknowledging an important gap in the literature, researchers have called for longitudinal studies of the effects of childhood and adolescent characteristics and experiences on occupational outcomes in adulthood (Hartung et al., 2005). We addressed this call by using longitudinal data from a study that began when children averaged 10 years of age and assessed gendered occupational outcomes in young adulthood. We also moved beyond previously measured outcomes such as career

aspirations, college majors, and course enrollment intentions (Frome et al., 2006; Tracey & Hopkins, 2001) to assess the gendered nature of young adults' occupations (i.e., proportion of male/female in a given occupation). Finally, we also examined income as another marker of gendered occupational outcomes. Although the gender composition of the US workforce has changed with men now concentrated in both low-wage and high-salary occupations, women continue to earn less than men, on average (Hegewisch et al., 2010).

Longitudinal Associations between Interests and Skills

To better understand the gendered bases of occupational choices, we also explored the interplay between gendered interests and skills from middle childhood through middle adolescence grounded in the expectancy-value model. Eccles, Wigfield, and colleagues (Eccles, 1987; Wigfield, 1994) posited and found evidence that interests were directly associated with achievement-related choices, such as academic performance and course enrollment, whereas skills were indirectly related through their impact on interests (Wigfield, 1994). We still know little, however, about the directionality of relations between interests and skills (Spinath & Steinmayr, 2008). Supporting the expectancy-value model, one study found that youths' ratings of their skills predicted their interests in academic subjects, but analyses did not test whether interests predicted skills or whether links were bidirectional (Jacobs et al., 2002). Building on the expectancy-value model, however, recent studies have documented reciprocal links between interests and skills. For example, using short term longitudinal data, researchers have found bidirectional links between math interests and skills among late elementary (Tracey, 2002), middle school (Marsh et al., 2005), and college students (Bonitz et al., 2010). Further, a study of young children's academic motivation in math and reading found that changes in skills predicted changes in interests and some evidence that interests predicted skills (Nurmi & Aunola, 2005).

This study addressed some of the gaps in prior research on the links between skills and interests. First, prior longitudinal studies focused on time intervals of a year or less (Nauta et al., 2002; Tracey, 2002), a relatively short time for stable changes in interests and/or skills to emerge. In this study we measured skills and interests at three points in time across seven years. Further, prior studies examined interests and skills in specific domains, such as sports, math, or technology (Bonitz et al., 2010; Nurmi & Aunola, 2005). Toward developing a more general picture of the role of gender, we assessed skills and interests in range of gendered activities extending from the academic (e.g., math, language arts) to leisure (e.g., sports, music) domains.

The Present Study

Our first goal was to examine the interplay between gendered interests and skills across time, from middle childhood to middle adolescence to determine test whether skills predicted interests, interests predicted skills, or interests and skills were reciprocally related over time. Next, we assessed whether gender-typed activity interests and skills in middle adolescence predicted gendered occupational outcomes in young adulthood, specifically, the gender-typicality of occupations as well as income. In addressing both goals, we tested whether biological sex moderated these linkages.

Methods

Participants

Data were drawn from the 1st, 3rd, 7th, and 11th years (referred to as Times 1 through 4 hereafter) of a longitudinal study exploring family relationships and youth development—the years when the data of interest were collected. Recruitment letters were sent to families in 16 school districts of a northeastern state, and families that were interested and eligible for participation returned postcards to the project office. Families were eligible if mothers and fathers were always-married and employed and if they included a firstborn child in the fourth or fifth grade with at least one sibling, 1–4 years younger. The number of families that fulfilled our recruitment criteria but failed to respond was not known, but over 90% of families that returned postcards and were eligible agreed to participate (total $N = 203$ families). We deleted two families that dropped out after Time 1 and focused on youth from the remaining 201 families. Retention across the 15 years of the study averaged 88%. Reflecting the ethnic background of families of the state where the study was conducted (85% European American; US Census Bureau, 2000), the sample included almost exclusively European American families living in small cities, towns, and rural communities. Moreover, reflecting the educational ($> 80\%$ of adults completed high school) and financial (median income = \$55,714 for married-couple families) backgrounds of the targeted population (US Census Bureau, 2000), at Time 1, the average education level was 14.57 years ($SD = 2.15$, range = 12–20) for mothers and 14.67 years ($SD = 2.43$, range = 10–20) for fathers (where a score of 12 signified a high school graduate), and the median family income at Time 1 was \$55,000 ($SD = 28,613$, range = 21,000–207,000). Parental education and family income were variable, however, ranging from working to upper middle-class. There were about equal numbers of male and female youth (51% girls), and youth age averaged 9.6 ($SD = 1.5$), 11.5 ($SD = 1.5$), 16.1 ($SD = 1.6$), and 25.0 ($SD = 1.6$) years, respectively, at the four waves.

Procedure

Data were collected from mothers, fathers, and the two siblings via two methods. At Times 1, 2, and 3, trained interviewers conducted home interviews to obtain family members' subjective reports of their personal characteristics and family relationships. The interviews began with informed consent/assent procedures, and families were given an honorarium that ranged from \$100 to \$200 depending on the study year. Family members were then interviewed separately. At Time 4, respondents were interviewed by phone and also completed a web-based survey. Consent was audio-recorded during the phone interview, and young adults received \$100 and parents received \$25 for their participation.

Measures

Gendered interests during childhood and adolescence were assessed in the home interviews using a measure adapted from Huston, McHale, and Crouter (1985). Parents (at Time 1) and youth (at each time point) used a 4-point scale (1 = *not at all interested*, 4 = *very interested*) to rate their interests in doing, watching, or reading about 25 activities selected based on time diary data from the target population. Building on prior research that has relied primarily on interest inventories (Crites 1999), we aimed to assess youth's manifest interests.

Manifest interests--such as participation in particular activities--reflect individuals' preferences because activities represent outlets for individuals to display their likings within a given environment (Super & Crites, 1962). Thus, particularly in research on children and adolescents, a focus on activities is an effective means of capturing youth's interests.

The socially constructed nature of gender means that gendered qualities vary across time and place. Accordingly, to categorize activities as stereotypically female-typed and male-typed for this sample, we used data from parents, testing for gender differences in mothers' versus fathers' ratings. Activities were classified as female-typed if mothers reported more interest in the activity than fathers and male-typed if fathers reported significantly more interest in the activity than mothers ($p < .05$; McHale, Kim, Dotterer, Crouter & Booth, 2009). Female-typed activities included dance, handicrafts, music, read, write, gymnastics, art, garden, play card/board games, hike/go for walk, activities with pets or animals, religious activities, and language arts; male-typed activities included sports, build, hunt/fish, watch TV, social studies, math, and science. Activities (water activities/swim, computer games, biking/skating, collecting things, organizational/club activities) not rated differently by mothers versus fathers were not included in the analyses. Cross-time stability coefficients for youth ranged from $r = .36$ to $.54$ for female-typed and $r = .34$ to $.53$ for male-typed interests.

Gendered skills were assessed via youths' ratings of how good they were at performing each of the activities from the list of gendered interests using a 4-point scale (1 = *unskilled*, 4 = *very skilled*). Some activities on which youth rated their interests were not skill-based and so were not included in the skill measure (i.e., watch TV, religious activities, pets and animals).

Gender typicality of jobs in young adulthood was measured by coding the occupations that young adults reported at Time 4. Occupations were coded if the young adult was not currently in school or if the education program was directly relevant to the current occupation (e.g., an elementary teacher earning his/her Master's degree in education while working as a teacher). If a young adult was currently in school and working in an occupation that was not relevant to the educational path, the occupation was not coded (e.g., a student majoring in Media Studies who worked as a bartender). Inter-rater agreement on whether the occupations of those who were also in school were relevant to their education programs was 76.8%; coders discussed all disagreements to make final decisions. Next, occupational gender typicality was coded by matching reports of jobs to the US Census Bureau's (2000) listing of occupations, which includes information on the percent of females in each occupation. For example, construction trades were considered highly male-typed (97.2% male), preschool teachers were highly female-typed (97.8% female), and writers were gender-neutral (52.8% female).

Income was measured as young adults' reports of their annual gross income from their primary job. Income reports ranged from \$ 0 to \$ 175,000; $M = \$ 30,534$; $SD = \$ 23,578$. This variable was transformed into T scores for the analyses to aid in model convergence.

Analytic Plan

Analyses were conducted in two steps using Mplus (Muthén & Muthén, 1998-2011). To address our first goal of testing the interplay of gendered skills and interests from middle

childhood through middle adolescence, we fitted cross-lagged models to: (a) the data on female-typed orientations and (b) the data on male-typed orientations. For each of these analyses, we started with a bidirectional cross-lagged model and removed paths (i.e., constrained path coefficients to zero) to test three nested models: interests as antecedents, skills as antecedents, and an autoregressive model. Each time, we compared the fit indices of the model to those of the bidirectional model to assess the adequacy of the model. Also, because two siblings were clustered within each family, we used the CLUSTER option in Mplus to address the non-independence of observations (Muthén & Muthén, 1998-2011). Maximum likelihood estimation was applied to handle missing data (Schafer & Graham, 2002), and all models controlled for youth age at Time 1 because youth differed in age.

To address our second goal of determining whether gendered skills and/or interests in middle adolescence predicted occupation-related outcomes in young adulthood, we added the two outcomes, gender-typicality of job and income, to the models. The analyses that addressed our first goal were conducted using the overall sample, but we only included young adults who had scores on each outcome measure, in the analyses examining the second goal. For example, some young adults were still in school and lacked data on gender-typicality of job and income. Thus the sample we used for the gender-typicality of job (JOB) included young adults who were employed full time or working in a job that was closely related to their current major if they also were in school ($N = 214$). The sample for the income outcome measure (INC) included only those who reported on their incomes ($N = 211$; part-time or full-time); here, young adults (e.g., full time homemakers) who reported meaningful zeros were included, but those who did not report an income were treated as missing and excluded. After determining the final models in addressing both our first and second goals, we tested for gender moderation via a multi-group analysis. A fully constrained model was compared against the freely estimated model to determine if covariances between variables were invariant across gender groups.

Results

Preliminary Analyses

Descriptive data are shown in Table 1. A 2 (gender) $\times$ 3 (time) mixed model ANOVA revealed that skills and interests declined over time, consistent with findings from previous longitudinal studies, $F_{\text{female-typed interests}}(1.94, 730.79) = 361.86, p < .001$; $F_{\text{female-typed skills}}(1.92, 725.43) = 212.14, p < .001$; $F_{\text{male-typed interests}}(1.95, 735.91) = 232.04, p < .001$, $F_{\text{male-typed skills}}(1.95, 733.44) = 87.84, p < .001$, (Wigfield & Eccles, 2000). Gender was also a significant between-subject factor: girls rated themselves as higher in interest and skill in the female-typed domains than boys, $F_{\text{female-typed interests}}(1, 376) = 129.80, p < .001$ and $F_{\text{female-typed skills}}(1, 376) = 106.56, p < .001$, whereas boys reported more interest and skill in the male-typed domain than girls, $F_{\text{male-typed interests}}(1, 376) = 195.02, p < .001$ and $F_{\text{male-typed skills}}(1, 376) = 187.47, p < .001$. To compare girls' and boys' *gender-typical* skills and interests (i.e., girls' *female-typed* interests and skills, and boys' *male-typed* interests and skills), we conducted a second 2 (gender) $\times$ 3 (time) mixed model ANOVA. On average, boys reported greater gender-typical skills and interests than girls, $F(1, 376) = 56.18, p < .001$, for interests, $F(1, 376) = 78.46, p < .001$, for skills. There was also a linear time by

gender interaction, indicating a slower decline in gender-typical skills among boys than girls, $F(2, 752) = 13.55, p < .001$. Finally, a 2 (gender) $\times$ 3 (time) mixed model ANOVA focused on *gender-atypical* skills and interests (i.e., girls' *male*-typed interests and skills versus boys' *female*-typed interests and skills) revealed that girls reported greater cross-gender skills and interests than boys, $F(1,376) = 11.01, p < .01$, for skills; $F(1,376) = 18.16, p < .001$, for interests, and a time by gender interaction indicated that boys' female-typed interests declined at a faster pace than did girls' male-typed interests, $F(2, 752) = 3.182, p < .05$.

Cross-time correlations of skills and interests revealed substantial stability and that stability was higher across shorter time intervals. Further, concurrent correlations between skills and interests were high ($r = .72 - .76$). Gender-typed interests and skills at all phases were associated at the bivariate level with occupational gender typicality scores, but rarely with income. Finally, female-typicality of job was negatively related to income, but the low correlation indicated that the occupational outcomes were distinct.

Longitudinal Interplay between Gender-typed Interests and Skills

Fit indices are presented in Table 2. Beginning with male-typed orientations, results demonstrated that the bidirectional model—skills and interests are mutually influential over time—was the best fitting model (Figure 1). The absolute fit (chi-squared) of the bidirectional model was excellent: Controlling for contemporaneous skills, youth who reported greater male-typed interests reported stronger male-typed skills at the subsequent time of measurement and vice versa. For the female-typed domain, in contrast, the best fitting model was the interests-as- antecedents model. As evident in Table 2, the bidirectional model also demonstrated a good fit, but removing the paths from skills to interests did not significantly change the bidirectional model, suggesting that the more parsimonious model would be a better choice. Results indicated that youths who reported greater interests later reported stronger skills. No evidence of gender moderation was found for either the male-typed or the female-typed model.

Gender-typed Interests and Skills as Predictors of Occupational Outcomes

To investigate the role of adolescents' gender-typed interests and skills in young adult occupational outcomes, paths from Time 3 interests and skills to Time 4 outcomes were added to the final models from the prior analyses (i.e., bidirectional model for male-typed and interests-as- antecedent female-typed model). We used the percent of females in occupations as the index of the gender-typicality of jobs in the female-typed orientation model and this was reverse-coded in the male-typed orientation model. Results revealed that greater male-typed skills and interests both predicted working in more male-typed occupations. Further, greater male-typed skills predicted higher incomes. Female-typed skills predicted working in a female-typed occupation in young adulthood, but not income, and female-typed interests were related to neither of the occupational outcomes. Tests for gender moderation were non-significant.

Discussion

Occupational choices can have important implications at the individual level because workers' job satisfaction is tied to their overall sense of well-being (Bowling, Eschelman, & Wang, 2010). Work organizations and society, at large, are also affected by individuals' occupational choices because economic growth is tied to workers' productivity. To the extent that gender segregation in the world of work keeps individuals from involvement in occupations that fit their interests and skills, their job satisfaction and performance may be impaired. Given the potential importance of early life precursors of gendered occupational outcomes, this study was aimed at illuminating the interplay between gender-typed interests and skills across middle childhood and adolescence and testing whether interests and skills predicted gender-typed jobs and income in young adulthood.

In addressing these goals, we contributed to the literature on occupational achievement in several ways. First, we examined gender-typed skills and interests spanning from middle childhood to adolescence in an effort to illuminate developmental processes that give rise to gendered occupational achievement in young adulthood. Our findings built on prior short term longitudinal and retrospective studies focused on proxies of occupation attainment such as career aspirations, college majors and course enrollment (Frome et al., 2006; Tracey & Hopkins, 2001) to examine the gendered nature of jobs and income in young adulthood. The findings were consistent with recent research in documenting bidirectional links between interests and skills— but only for male-typed activities. Further, we found that male-typed interests and skills in adolescence were more consistently linked to occupational outcomes in young adulthood than were female-typed characteristics. Below we discuss implications of the findings and directions for future research.

Longitudinal Interplay between Gender-Typed Interests and Skills

Our results build on the expectancy-value model in documenting longitudinal links between gendered interests and skills. For male-typed activities only, these linkages were bidirectional: Youths' perceptions of skills were linked to relatively greater interest in those activities over time, and interest in male-typed activities lead to greater feelings of competence. These findings are consistent with research documenting bidirectional links between skills and interests in specific academic and occupational domains, such as math and technology (Nauta et al. 2002; Tracey, 2002; Bonitz et al., 2010; Marsh et al., 2005), and with Jacobs et al.'s (2002) proposal that the direction of influence between interests and skills may be bidirectional.

In contrast to findings for the male-typed activity domain, however, a unidirectional model best fit the data on female-typed activities: Interests predicted skills, but not the reverse. Female-typed interests and skills are less well-studied than male-typed ones, and in combination with the results for the male-typed model, the results suggest that these processes may be domain-specific. The expectancy-value model explains how individuals make choices in the achievement domains. In contrast, the female-typed activities we studied may be less relevant to individual achievement outcomes. For example, female-typed activities such as art, music, and handicrafts may be more oriented to self-expression than achievement. Thus, bidirectional links between skills and interests may be most

apparent in domains that are socio-culturally constructed as “male-typed” to the extent these are achievement-focused.

Because gender is socially constructed, we categorized activities as gender-typed based on whether mothers and fathers differed significantly in their interest ratings. To the extent that fathers were more focused on individual achievement than mothers, the male-typed activity domain may have been more relevant to the propositions of the expectancy value model than were the female-typed ones. Indeed, our descriptive data, showing that girls endorsed male-typed activities more strongly than boys endorsed female-typed ones is consistent with the idea that the former are imbued with greater status and prestige—consistent with their tie to achievement.

The potentially different patterns of association between interests and skills across domains require additional study. Using longitudinal data with varying timespans, alternative approaches to defining domains (e.g., interacting with people versus technology) may advance understanding of the interrelations between interests and skills. At the most general level, however, the practical implications of these findings center on fostering youths' interests in a range of activities. Our results were consistent with prior research in documenting declines across time in both youths' interests and skills, and highlight the importance of developing strategies to maintain youths' activity interests across adolescence. Some research suggests, for example, that parents' joint involvement in activities with their children as well as their own interests can help to stem normative declines in youths' activity interests across the adolescent years (Dotterer, McHale, Crouter, 2009). Intervention programs that promote and support youths' leisure time interests have positive effects on youth adjustment (Caldwell & Faulk, 2013), but their impact on youth career development remains to be studied.

Gendered Interests/Skills and Occupational Outcomes in Adulthood

Our second goal was to test whether gender-typed activity interests and skills in middle adolescence predicted occupational outcomes in young adulthood. We found that feeling competent in gender-typed activity domains predicted choosing an aligning-gender-typed occupation: At the bivariate level these predictive associations were already evident in ten-year olds. The link between self-rated abilities and occupational choices is documented in numerous studies, with alignment assessed within specific occupations or task domains such as reading, math, science and technology (Durik et al., 2006; Wang et al., 2013) as well as in typologies of occupations (Tracey & Hopkins, 2001). Our study provides new information in showing that gendered skills and interests in middle childhood may factor into occupational attainment and income and extend prior research by tapping into broad domains of activities ranging from academic to leisure. The focus on youths' leisure activities, in turn, directs attention to non-work activities that can give rise to occupational skills and interests. For example, are social interactional skills developed through playing on sports teams or playing cards and board games related to effective teamwork and communication skills in a work setting? Some scholars have argued that work and leisure are interrelated (Hartung, 2002): Individuals aim to find work that brings pleasure (as in play), and leisure activities often include the goal-oriented components of work, such as

winning a game or achieving a target in sports performance. The research literatures on leisure and work have typically been separate, however, and interdisciplinary study is an important next step for furthering understanding of the developmental precursors of occupational outcomes. Such research is particularly important for understanding childhood career development given that young children in the US spend a significant portion of their time in play and leisure activities (Hofferth & Sandberg, 2001).

Beyond occupational choices, our findings showed that male-typed skills, but neither female-typed skills or interests, predicted higher incomes in young adulthood. Again, to the extent that male-typed skills are related to socio-culturally defined achievement, such competencies may explain higher salaries. For example, the annual mean wage of STEM-related occupations is higher than most non-STEM occupations (Bureau of Labor Statistics, 2014b). In this study, math and science were classified as male-typed activities, and this may help to explain the positive association between male-typed skills and income.

Consistent with the expectancy value model, a significant link between male-typed interests and male-typed jobs emerged (Eccles, 1987). However, as described above, both male-typed interests *and* skills directly predicted a choice of a male-dominant occupation. Interests are a crucial factor, but not the only factor in occupational decision-making, and our findings suggest that both can play a role in occupational choices (Skorikov & Patton, 2007).

In the face of gender differences in youths' skills, interests, occupations and interests, we found no evidence of gender moderation in these developmental processes. As such, our findings run counter to earlier theories that emphasize male-female differences in the process of choosing an occupation (Betz & Fitzgerald, 1987; Gottfredson, 1981). A cohort effect may be operating such that the current generation of young adults are less well defined by their biological sex. Future research should continue to “unpack” biological sex to identify the gendered characteristics and experiences that underlie occupational choices and outcomes. For example, a person-oriented approach may illuminate how a range of gendered characteristics and experiences, including skills, interests, personality, attitudes, and family gender socialization operate in tandem to explain differences in occupational outcomes (Vondracek & Porfeli, 2002).

Limitations and Directions for Future Research

Limitations of this study imply important directions for future work. First, our sample was limited to individuals in their 20s, including those who were still pursuing post-secondary education, an early-stage of career life that leaves room for change in occupations and income. Future longitudinal research should extend to later points in the lifespan to illuminate the long term implications of youths' gendered characteristics and experiences for occupational outcomes. The sample also was homogeneous in terms of family demographics, and thus our findings require replication including in sociocultural groups wherein gender norms are more variable. Relatedly, although we moved beyond prior research to examine a broader array of activities to study the role of gender in occupational outcomes, future studies should examine other dimensions of activities.

In the face of these limitations, this study provided additional support for the expectancy value model and advanced understanding of the developmental precursors of occupational outcomes by virtue of its focus youths' gendered characteristics, longitudinal scope, and measurement of young adults' actual jobs and incomes. Gender segregation has long characterized the workplace (Hegewisch et al., 2010). Secular changes in gender attitudes along with increasing involvement of women in the labor force and men in family roles, however, may expand the career horizons of both women and men in ways that ultimately increase job satisfaction and performance. Our findings suggest that individual characteristics that emerge in childhood may be important factors in such occupational outcomes, and at the most general level, underscore the importance of providing educational programs and supports—beginning in childhood—that promote and support youth career development.

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Highlights

- Female-typed activity interests predict female-typed skills but not the reverse.
- Male-typed interests and skills are linked over time in a bidirectional way.
- Male-typed interests and skills both predict occupational outcomes.
- Female-typed skills, but not interests, predict occupational outcomes.

Figure 1.

(Top) The longitudinal associations between male-typed skills and interests. Path coefficients are shown with standard errors in parentheses and standardized coefficients in brackets. $\chi^2(4) = 5.80$, $p = .21$; CFI = .998, TLI = .989, RMSEA = .034 (Bottom) The longitudinal associations between female-typed skills and interests. $\chi^2(6) = 9.42$, $p = .15$; CFI = .996, TLI = .988, RMSEA = .038 *Note.* Individuals clustered within families; controlled for age (not shown) † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 2.

Male-typed interests and skills predicting occupational outcomes. *Note.* Path coefficients are shown with standard errors in parentheses and standardized coefficients in brackets. JOB sample used gender-typicality of occupation as outcome ($n = 214$). Model fit was $\chi^2(8) = 24.73, p < .05$; CFI = .969, TLI = .904, RMSEA = .099. INC sample used income as outcome ($n = 211$). Model fit was $\chi^2(8) = 5.57, p = .70$; CFI = 1.000, TLI = 1.014, RMSEA = .000. Contemporaneous error variances of the observed variables were allowed to covary but these were hidden from the above figure for simplicity's sake. † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 3.

Female-typed interests and skills predicting occupational outcomes. *Note.* Path coefficients are shown with standard errors in parentheses and standardized coefficients in brackets. JOB sample used gender-typicality of occupation as outcome ($n = 214$). Model fit was $\chi^2(10) = 19.53$, $p < .05$; CFI = .980, TLI = .950, RMSEA = .067. INC sample used income as outcome ($n = 211$). Model fit was $\chi^2(10) = 13.32$, $p = .21$; CFI = .993, TLI = .983, RMSEA = .040. All models are controlled for age. Dotted line indicates non-significant path. Contemporaneous error variances of the observed variables were allowed to covary but these were hidden from the above figure for simplicity's sake. [†] $p < .10$. * $p < .05$, ** $p < .01$, *** $p < .001$

Means, Standard Deviations (SD) and Correlations for Study Variables (Overall Sample, N = 402)

Table 1

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. M interests (T1)	-													
2. M interests (T2)	.53*	-												
3. M interests (T3)	.34*	.47*	-											
4. M skills (T1)	.75*	.48*	.31*	-										
5. M skills (T2)	.49*	.72*	.47*	.51*	-									
6. M skills (T3)	.33*	.46*	.75*	.30*	.49*	-								
7. F interests (T1)	.24*	-.02	-.05	.22*	-.04	-.18*	-							
8. F interests (T2)	-.02	.24*	.08	.00	.11*	-.07	.54*	-						
9. F interests (T3)	-.15*	.14*	.12*	-.10*	-.17*	-.09	.36*	.48*	-					
10. F skills (T1)	.19*	.01	-.05	.34*	.06	-.14*	.76*	.44*	.28*	-				
11. F skills (T2)	.00	.18*	.07	.10	.30*	.02	.48*	.75*	.35*	.52*	-			
12. F skills (T3)	-.17*	-.17*	.02	-.08	-.15	.03	.29*	.36*	.74*	.26*	.39*	-		
13. % female in job	-.30*	-.39*	-.35*	-.27*	-.41*	-.34*	.26*	.21*	.29*	.22*	.21*	.29*	-	
14. Income	.04	.04	.06	.07	.08	.15*	-.11	-.16*	-.04	-.09	-.08	.03	-.23*	-
Overall	Mean	3.16	2.89	2.55	3.06	2.89	2.65	3.07	2.71	2.38	2.98	2.68	2.45	48.26
	SD	0.50	0.54	0.52	0.52	0.58	0.54	0.48	0.47	0.45	0.45	0.46	0.42	29.0
Girls	Mean	2.94	2.61	2.34	2.88	2.60	2.39	3.24	2.83	2.55	3.12	2.79	2.60	63.96
	SD	0.48	0.47	0.44	0.52	0.51	0.47	0.43	0.44	0.41	0.45	0.43	0.39	23.62
Boys	Mean	3.38	3.18	2.77	3.24	3.19	2.92	2.83	2.49	2.11	2.79	2.49	2.21	31.98
	SD	0.41	0.44	0.50	0.46	0.48	0.46	0.46	0.46	0.41	0.41	0.46	0.41	24.87

Note. M: Male-typed, F: Female-typed.

* $p < .05$

Table 2
Fit Indices and Model Comparisons for Analyses Predicting Gender-typed Skills and Interests from Middle Childhood through Middle Adolescence (N = 402)

	χ^2	df	CFI	TLI	RMSEA	χ^2 (df) ^a
Male-typed skills/interests						
1. Bidirectional model	5.803	4	.998	.989	.034	--
2. Skills as antecedents	28.451***	6	.969	.908	.098	22.190 (2) ***
3. Interests as antecedents	30.905***	6	.966	.898	.103	24.560 (2) ***
4. Autoregressive model	95.864***	8	.881	.731	.168	89.267 (4) ***
Female-typed skills/interests						
1. Bidirectional model	5.921	4	.998	.990	.035	--
2. Skills as antecedents	17.168**	6	.987	.962	.069	10.297 (2) **
3. Interests as antecedents	9.419	6	.996	.988	.038	3.658 (2)
4. Autoregressive model	41.052***	8	.962	.915	.103	38.354 (4) ***

Note.

^aWhen comparing models, the scaling correction factor for MLR (an Mplus option for maximum likelihood estimation with robust standard errors) was used to generate the chi-square differences (Satorra & Bentler, 1999).

*
 $p < .05$

**
 $p < .01$

 $p < .001$.