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Career Development From Adolescence Through Emerging Adulthood Insights From Information Technology Occupations

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Abstract

Career development theories suggest that social-contextual experiences are influential in individuals' career interests, aspirations, and skill development and may be a source of gender and ethnic differences in certain career fields. In this mixed methods study, we examine the supportive and obstructive career-related experiences of 13 men and 13 women (modal age 25). Interviews focused primarily on the pathway toward or away from an information technology (IT) career. Thematic coding indicated that parents were mostly supportive, while experiences in school and work occasionally made individuals reconsider their career plans. Social influences often changed developmentally as participants entered full-time jobs. Gendered participation in IT was often attributed to women's perception that it is a male-oriented field.

Keywords

career development; adolescence; emerging adulthood; gender; ethnic differences; socialization; technology

Attracting new employees to science, technology, engineering, and mathematics (STEM) jobs, as well as increasing the diversity of this workforce, has been of great interest to researchers, policy makers, and employers in recent years (Meece, 2006). Despite efforts to increase the number of women and minorities in STEM careers, they remain underrepresented in the STEM workforce (National Science Foundation, 1996). Career development theories suggest that individuals select career fields based on their self-perceptions, values, and beliefs and that individual differences in these cognitions can explain much of the gender and ethnic gaps in career field participation (Eccles et al., 1983; Gottfredson, 1981; Lent, Brown, & Hackett, 1994; Savickas, 2005). Although internal cognitions are the most proximal factors to career choice, career development theorists also suggest that these cognitions are developed through experiences in homes, schools, and other contexts and that these experiences may be more distal sources of imbalanced workforces.

In one particular STEM field, information technology (IT), the rapid creation of new jobs has led to a shortage of qualified employees (U.S. Department of Commerce, 2003). As with

other STEM careers, the IT field currently attracts substantially more men than women and more European Americans and Asian Americans than members of other ethnic groups (National Science Foundation, 1996; U.S. Department of Commerce, 2003; Zarrett, Malanchuk, Davis-Kean, & Eccles, 2006). For instance, women hold less than 30% of the jobs in professional IT occupations (U.S. Department of Labor, 2005), and African Americans receive approximately 11% of all bachelor's degrees, 6% of all master's, and 2% of all doctorates in computer science (U.S. Department of Commerce, 2003).

This article examines the career path of emerging adults who enter IT careers and those who could enter these careers but do not in order to highlight socialization influences that may contribute to occupational choices. Examining the IT field in particular has the unique potential to highlight both gender and racial differences in socialization toward (or away from) some occupations.

Socialization and Career Choices

The occupational choices made by emerging adults have their roots in earlier interactions and experiences (Eccles et al., 1983; Gottfredson, 1981; Lent et al., 1994; Savickas, 2005; Whiston & Keller, 2004). For instance, children begin to learn about possible future jobs through seeing adults in their communities and parents' social networks (Schultheiss, Palma, & Manzi, 2005; Super, 1990). Self-perceptions develop through experiences in school (Lent et al., 1994) and feedback from one's social network (Jacobs, Davis-Kean, Bleeker, Eccles, & Malanchuk, 2005). During adolescence, individuals often engage in and value the same activities as their friends in order to fulfill a need for relatedness (Fredricks et al., 2002); such activity participation may lead them toward particular career paths. Part-time work during adolescence is also a key source of information about work and one's place in the workforce (Levine & Hoffner, 2006). Jacobs and Eccles (2000) suggested that parents influence their children's values in four main ways: developing a socioemotional climate, acting as role models, providing key experiences, and transmitting their perceptions and expectations. Thus, the proximal, internal influences on emerging adults' career have their roots in earlier experiences.

Given gender differences in the composition of some career fields (e.g., IT), researchers have theorized that career choices partially arise from gender role socialization throughout life (Eccles et al., 1993; Martin & Ruble, 2004). Children's awareness of their gender and social class influence their perceptions of appropriate career aspirations (Eccles, 1994; Gottfredson 1981, 2005). There is also evidence that parents' beliefs about gender differences in children's abilities are transmitted to and internalized by their children (Eccles Parsons, Adler, & Kaczala, 1982; Frome & Eccles, 1998) and that there are ethnic differences in the messages that children internalize from their parents (Whiston & Keller, 2004). Opportunities for skill development vary considerably and may contribute to differences in career-related self-efficacies (Lent et al., 1994; Turner et al., 2004). Despite different socialization, the same career development and occupational choice processes seem to occur for men and women as well as European Americans and minorities (Lent et al., 2005).

Emerging adulthood is a particularly meaningful age period in which to study career development because of the unique experiences that emerging adults have regarding the world of work (Arnett, 2004; Hamilton & Hamilton, 2006). This is an age during which previous socialization combines with current experiences to shape career choices and long-term goals. Emerging adults are more independent than children and adolescents, but their parents and other important people still actively influence their career opportunities (Arnett, 2004; Whiston & Keller, 2004).

In addition, emerging adults are still engaged in identity exploration, of which one of the most salient aspects is occupational identity (Arnett, 2004; Hamilton & Hamilton, 2006). Many individuals also continue to explore potential paths and identities during postsecondary educational pursuits and workplace experiences. However, not all emerging adults are able to construct their own careers to the same degree (Blustein, 2004). Thus, not only is the study of emerging adults useful for examining distal factors in career development, it is also useful for examining active occupational identity formation and contextual influences.

In this article, we examine the socialization processes and experiences that have influenced emerging adults' career development. Although previous research has examined many aspects of career development, we still do not fully understand the contextual and social influences on emerging adults' choices to reject one career path in favor of another. To examine potential causes for differential gender and ethnic representation in some careers, as well as to apply general career development theories to a single career field, we address three research questions. First, how might families influence emerging adults' career paths, specifically into IT careers? Second, how do educational experiences influence children's, adolescents', and emerging adults' progression toward or regression away from an IT career? Third, what other formative experiences do emerging adults mention when they recall their career paths? While addressing these questions we pay particular attention to instances in which the experiences of boys and girls, or women and men, appear to differ substantially. This study has the advantage of examining statements from in-depth interviews as well as comparing the common experiences described in these interviews to survey data collected from a larger sample.

Method

Data used in this study come from a subsample of a longitudinal project that began in 1991. The lead investigators of the project chose to collect data from a particular county near Washington, D.C., because of the unique demographic composition of this area during the early 1990s. The diversity of actual towns and neighborhoods in the region varied, but throughout the county both European American and African American families were well represented. In addition, income was normally distributed for both African Americans and European Americans, and the income discrepancy between these groups was much less than the discrepancy found in national samples. The original sample consisted of 61% African Americans, 35% European Americans, and 4% youth of other ethnicities. Mean age at the first data collection was 12 years old. More information about the sample is provided by Sameroff, Peck, and Eccles (2004).

This sample provides an excellent resource to examine the early computer experiences of children who are now young adult workers. Since the majority of the sample was born in 1979, they were among the first generation to grow up with home computers and computers in their classrooms. However, their exposure to computers was quite variable; some had these resources in early childhood or elementary school, while others first had consistent access to computers in high school or later.

During the first wave of data collection, participants were 7th-grade students in a public school district. Data were collected again when the majority of these participants were going into the 9th grade and in 11th grade, as well as at ages 19 and 21. For the first three waves of data collection participants completed a survey and a face-to-face interview at home. In the two waves collected after high school, participants completed and returned mailed surveys.

Qualitative data specific to career development were collected in a separate wave of data collection, when the participants were approximately 25 years old. At that time, we used data from the longitudinal sample to select a smaller sample of participants. Specifically, 74 individuals were targeted based on their potential to enter an IT career. IT careers were identified by 1990 U.S. census occupation codes for both aspirations and actual jobs at age 25 and included jobs such as computer programmer and network administrator. Participants were deemed as having the potential to enter an IT career if they met at least two of the following criteria: (a) having an IT career aspiration in at least two of the last three surveys, (b) frequently playing video or computer games, (c) having taken at least one IT course, or (d) reporting a high self-concept in mathematics in at least two surveys. Each of these criteria has been related to occupational choice in general or choice of an IT career in particular (Eccles et al., 1983; Kiesler, Sproull, & Eccles, 1985; Lent et al., 1994). Further information about the targeted sub-sample may be obtained from the authors.

Two interviewers attempted to contact all of the participants by phone and with letters; 59 were successfully contacted and completed a screening interview. From the information in these interviews, 10 individuals who were employed in the IT field and 18 individuals who were in a variety of non-IT fields were asked to complete longer interviews about their careers. Non-IT fields included both “soft” computer jobs (i.e., administrative support) and jobs that, according to the participants, did not require extensive computer use (i.e., teachers). Two interview tapes were corrupted and not included in the current analyses, leaving transcripts of only 16 individuals of the original 18 who were not in IT fields. Table 1 shows the pseudonym of each participant who was contacted and completed the career development interview. Of the 26 final participants whose interviews we report in this study, 1 was a student in a professional degree program, 12 were graduates of 4-year colleges, 1 was a graduate of a 2-year college, 2 were still enrolled in college, and 10 had no degree higher than a high school diploma.

Semistructured career development interviews were conducted with the 28 selected individuals by phone; these lasted between 45 and 150 minutes. Each participant received a \$100 honorarium after they completed the interview. The interviews followed a standard protocol, but additional clarifying questions were asked when necessary. Typically, interview topics progressed as follows: an overview of their career path, early educational experiences (especially in math, English, and computers/technology), early socialization experiences, current job experiences, constraints and barriers in their lives and careers, career barriers that might impact others, and future goals. Participants who were students were also asked about their current courses in detail as well as their part-time jobs and their expectations for their future careers. To protect the identity of the participants, the authors assigned names to each individual who completed a final career development interview.

Data Analysis

We analyzed transcripts of the interviews with interpretative phenomenological analysis (IPA; Smith & Osborn, 2003). This approach acknowledges that participants' experiences are personal and subjective. Thus, although the research team held theoretically based assumptions, we sought to ground our codes in participants' own words to ensure an appropriate interpretation. Consistent with IPA, members of our research team began the coding process by independently reading each transcript while taking notes about the important issues that emerged in the interviews. The authors then held several meetings, during which we came to a consensus and created a coding scheme for the entirety of the interview protocol. The coding scheme was based loosely on several theoretical viewpoints (see Jacobs & Eccles, 2000; Lent et al., 1994), but we also included themes that emerged from the content of the interviews. Once the coding scheme was agreed upon by everyone, three members of the research team read and coded the same three interviews line by line.

After they reached agreement (Cohen's kappa > 0.90) on these interviews, they continued coding interviews independently and met periodically to reach consensus regarding difficult portions of a few interviews.

After coding was complete, the authors began weekly meetings to discuss relevant previous research and the emergent themes found in the interviews. We took this approach in an attempt to increase the validity of our interpretations. These meetings involved both (a) seeking confirming and disconfirming evidence for various career theories and (b) discussing the meaning of emergent, unexpected themes in the interviews.

To support our findings from the qualitative interviews, we also conducted descriptive analyses on the entire sample from which the interviewed participants were selected. These analyses used data from the most recent wave of survey data collection ($N = 574$), obtained when participants were approximately 21 years old. To capitalize on the diversity in this sample, we divided the majority of the sample into four categories based on their gender and ethnicity (African American females, African American males, European American females, and European American males). We used ANOVAs and cross-tabulations with chi-square statistics to compare differences in participants' experiences with computers. We separate participants into subgroups not to assume racial or gender differences in IT experiences but as a way to identify potential reasons for the unequal demographic composition of the IT workforce.

Results

For the purposes of clarity and brevity, we edited the quotes that are included in the following. Specifically, we deleted words unrelated to content, such as *um* or *like*. Occasionally, we deleted larger sections of the text in which participants changed their focus; these are identified by "...". Additionally, we added information in brackets to clarify terms that are ambiguous in the quotes but are clearer in the context of the larger interview. Readers who would like to read full, unedited transcripts may request them from the authors.

Question 1: How Might Families Influence Emerging Adults' Career Paths, Specifically the Path Into IT Careers?

Given the importance of parental support, expectations, and involvement in their children's lives for their children's educational success and career development, we identified themes outlined by Jacobs and Eccles (2000). During the interviews, participants were asked specifically about their parents' expectations for them and the messages they received from their parents about the IT field. In addition to these solicited accounts, participants often mentioned their parents when they spoke of experiences in their childhood or social supports that helped them to be successful. Names of participants who were coded into each thematic category are listed in Table 2.

When describing some of their earliest memories involving computers and technology, 4 participants who entered an IT career and 1 who did not recalled their parents acting as role models. These memories included parents working or playing on computers, parents who worked in the IT field, and parents giving them guidance about how to use computers. For example, when recalling his father using computers, Eric said,

My dad is very big into computer technology and I always enjoyed the respect everyone showed him and he always liked showing me everything he did. He was very happy with what he did. I realized ... not just the computer side of it, but just the fact that he loved what he did. I knew I had to find something that I loved to work [in/with] or I wouldn't enjoy working and I'd be miserable overall in life.

Having role models who use computers and convey interest or utility in doing so likely served as a message for these youth that they could and should do well with computers too. Furthermore, role models stimulate observational learning (Bandura, 1986) that may spark similar behavior as the participants tried to imitate and repeat the actions they saw.

In addition, 7 individuals who eventually entered IT careers and 4 individuals who did not reported that their parents provided either resources or key opportunities that encouraged them to explore a potential IT career. Most of these resources involved having family-owned or personal computers during elementary school or “when I was young.” In fact, 1 woman who did not enter the IT field was enrolled in a basic computer course before she began kindergarten. Tangible resources continued to play a role later in their career development. Namely, 2 individuals who eventually entered an IT job mentioned that their parents helped them pay for college tuition, and Dan reported that his mother helped him get a scholarship to study computers in college. Also, 2 individuals who did not enter IT mentioned parental financial assistance as key to being able to attend college.

Jacobs and Eccles (2000) suggested that parents transmit their perceptions and expectations about careers to their children. In the interviews, this form of influence appeared to be related to activities during childhood and later consisted of receiving messages about a particular job or career field. Amy recalled that when she was young, her father tried to communicate this message:

My dad ... loves computers. He loves to try, he loves to play with it, and he breaks it all the time. But he likes it anyway and he's not scared of breaking it. And I was always pleased with that attitude. He would say, “It's a computer. You can't break it. The worst you can do is make it not work, and then somebody will reboot it or we'll restart it or we'll wipe out the hard drive or something else, but then it would be fine again.” So it [this attitude] was always taught that no matter what I did ... everything was gonna be fixable.

As Amy grew older, her father's comments were directed toward specific career possibilities rather than toward general activities. For instance, her father communicated his perceptions of the benefits of accepting a particular job offer,

My father also works for the federal government. So when I got this government job he was excited because he likes the benefits. He's always enjoyed his work and he knew that it would be a good secure job for me, as compared to some of the more lucrative positions in private industry.

Also, 7 participants mentioned similar messages about computers or careers from their parents. Most individuals who recalled encouragement from their parents did not report it with a level of detail similar to Amy's; we coded these individuals as having received general encouragement, or a positive socioemotional climate, rather than direct statements of support. In addition, 7 individuals who eventually entered an IT job indicated that they had received general encouragement from their parents; this is approximately the same rate of encouragement received by participants who had not entered IT careers. These comments were similar to Dan's when he said, “My parents have always been supportive,” and did not suggest that parents pushed their children into a particular career field or job.

In sum, parents were often mentioned as sources of support, encouragement, assistance, and even initial exposure to the world of computing and technology. Their influence as sources of access to computers appeared early in participants' lives, but nearly all parents continued to play prominent roles during adolescence and young adulthood. Often, parents helped their children into an IT career path by providing broad encouragement or by paying for college tuition as their children sought to obtain official credentials, but encouragement or financial

support was not unique to participants who remained on an IT career path. Only a few participants did not mention their parents while describing their career path. Among the majority who did mention parents, their comments were primarily positive.

Since many individuals who entered an IT career mentioned having early access to computers, we thought this might be a source of differential socialization. In the earlier quantitative surveys conducted with the whole longitudinal sample at age 21, participants noted whether they had computers in their homes at various times in their lives. We performed cross-tabulations to examine early access to computers by ethnicity and gender; results are presented in Table 3. Participants' recollection of having a computer in the home during their elementary school and middle school years differed significantly. Throughout these years European Americans were more likely than African Americans to have access to computers in their homes. By high school, only African American females were less likely than expected (by chance alone) to have access to computers in their homes. European American participants continued to be more likely than expected to have computers in their homes during their high school years. If access to a computer in the home is enough to start children on the path toward an IT career, these results suggest that the European American participants would be more likely to enter an IT career than African Americans participants. However, it is likely that access to computers during childhood is not enough by itself to evoke movement toward an IT career. Furthermore, if it were enough, then other circumstances in youth's lives would need to be implicated in the gendered composition of the IT workforce.

Question 2: How Do Educational Experiences Influence Children's, Adolescents', and Emerging Adults' Progression Toward or Regression Away From an IT Career?

During the career interviews, participants were asked specifically about their memories of English classes, mathematics classes, and computer science or engineering classes during their entire educational history. From their responses, it was clear that their computer science and technology courses varied widely in content: Some participants were able to take advanced courses while in high school, whereas others only enrolled in very basic courses such as introduction to the Internet.

When describing their experiences in courses or in school, participants' comments revealed several distinct, but sometimes overlapping, themes. First, 6 individuals reported feeling capable in computer classes or while completing coursework. These comments took the form of describing their good grades or feeling that computer activities were easy for them; such reports reflect the benefits of high feelings of self-efficacy or competence that are theorized to be driving forces in career choices (Eccles et al., 1983; Lent et al., 1994). Not surprisingly then, 4 of these 6 entered the IT field.

Of the participants, 2 individuals who did not enter IT, 1 who entered IT but left by the time of the interview, and 1 who was still in IT mentioned that challenging courses provided reinforcement of their career aspirations for the IT field. In contrast, 2 participants who entered IT and 2 who did not mentioned that their courses proved to be too difficult: They felt underprepared for the coursework or struggled to receive passing grades. For instance, when describing one of her college courses, Amy said,

I took introduction to programming because for a while I thought I might want to make that switch [into an IT major]. [The class was] Programming in C[++]. That was terrible ... the projects built on each other ... sometimes I'd be so far behind on a previous project that I couldn't even get to the second project because the second project goes from the first one.

Despite her experience in this class, Amy did try to enter a major that required intensive computer use but was unable to do so because the program was too selective. Instead, she majored in a math-intensive field and pursued a non-IT career after graduating from college. Other research has shown that students make internal comparisons about their performance in multiple domains (Marsh & Hau, 2004) and likely prefer the content area in which they feel more capable (Eccles et al., 1983). Struggles doing well in difficult classes made these 4 participants question whether persistence in the IT field was worth the effort, and 2 of them chose a career field other than IT.

One theme that was always mentioned in a positive way was having a class-related opportunity to solve problems and make computers work. Of the participants who described their classroom experiences this way, 4 were in IT jobs at the time of the interview, 1 had entered IT and left, and 2 were not in IT. These 7 participants expressed this theme in several ways, such as working hands-on with computers, diagnosing and resolving problems, and seeing one's efforts pay off in a functional manner. These comments all involved working through a problem (either a real problem or an assignment) and attempting to solve it; often participants reported appreciating feedback from the computer that the problem had indeed been solved. Comments about problem solving appeared in many areas of the interviews; only some of these instances involved talking about classes. Angela fondly recalled the problem solving in her early computer classes when she said the classes "were really fun. I mean, it was just learning about computer science and being able to get computers to do something."

Of the participants, 6 seemed to have little or no exposure to computers before taking courses in middle school, high school, or after high school. In fact, 3 people described their first or only computer courses as being introductory, where they learned how to type or navigate the Internet. All of these individuals spoke of these basic courses in a positive way, but only 1 eventually entered an IT career.

For the students who did not have extensive previous exposure to computers, basic classes were useful and interesting. However, 4 other participants who were already experienced with computers felt that their courses were inadequate or outdated. For 3 participants (all of whom entered an IT job, though 1 left IT before the interview), coursework included using programming languages that were not relevant to their eventual jobs. The 4th participant who was dissatisfied with her courses, Melissa, could tell that she had not learned adequate skills to be competitive on the job market. Melissa attended a technical institute to focus on programming and network administration. After not learning as much as she felt she should have and "wasting thousands and thousands of dollars," she was so disappointed with the IT field that she decided to switch career paths. At the time of the interview, she was pursuing a career in the medical field instead.

In addition to difficult courses and inadequate course content, some participants reported negative encounters with teachers. In the case of 1 individual who was in IT and 1 who had already left the IT field, instructors presented the material in boring, ineffectual ways. In addition, 2 participants who never pursued IT-related jobs felt that their instructors were underprepared to teach the course material.

In sum, educational experiences were often positive in that they provided sources of self-efficacy and interest and they taught valuable computing skills. The qualities that made computer classes and educational experiences beneficial included being challenging (but not too difficult) and being applied and taught in a way in which students could see their efforts pay off. Yet, educational experiences were frequently negative as well and appeared behind the decision of some participants to not enter the IT field. This occurred when

courses were too difficult and students fell behind in their coursework, when teachers were underprepared to teach the class, and when the course content seemed outdated or out of touch with the IT workplace. Thus, although classes are one way to develop children's and adolescents' aspirations for an IT career, the quality of classes and fit of the course to students' skill level must be high to best encourage youth to enter or remain on the path to an IT career.

Since the value of educational experiences and the self-assessments drawn from them varied widely across participants, courses are a likely source of differential socialization by gender or ethnicity. Again, we turned to the larger, longitudinal sample from which these participants were selected to examine whether particular groups of youth were more likely to have positive or negative educational experiences. To do so, we performed cross-tabulations and ANOVAs. We found no gender or ethnic differences in whether youth had taken an IT course, Pearson $\chi^2(3) = .369, p = .95$. Among those youth who had taken at least one course related to IT, there were no significant gender or ethnic differences in their level of comfort with classmates, $F(3, 249) = 1.35, p = .26$, or their level of comfort with professors in these courses, $F(3, 248) = 1.41, p = .24$. There were also no significant differences in their enjoyment of the courses, $F(3, 389) = 2.58, p = .05$, although there was a trend for African Americans to enjoy the classes more than European Americans. Therefore, although many youth reported negative experiences in their IT-related classes, these experiences did not appear to be systematically related to gender or ethnicity.

Question 3: What Other Formative Experiences Do Emerging Adults Mention When They Recall Their Career Paths?

Other important people—Although participants did not mention people outside their families and schools as often as they mentioned their parents, a few participants did recall peers, counselors, relatives, and other adults as sources of formative experiences or assistance. For instance, before Dan entered an IT career, he became interested in computers after borrowing a programming book from his friend. Also, 2 participants who eventually entered IT were told by respected adults (a school counselor and a professional in the private sector) that they should enter a computer- or technology-related career. Furthermore, 1 future IT employee was allowed to format the hard drive of a family friend's computer. In addition to these key opportunities, family friends and others often expressed support and encouragement that was similar to the kind provided by parents.

Although networking is not always discussed in the career development literature (though see Lin, 1999, and Try, 2005, for a social capital perspective), it was discussed by a number of participants, including those who were in and who were not in IT careers. For instance, Adam and Michael obtained IT jobs at the same company as a friend. Ben was given his first IT job by his uncle and remained in the IT field ever since. Thus, although other individuals were not often involved in participants' career development, they certainly played important roles when they were involved.

Activities—To tap into experiences that occur outside of a traditional school setting, participants were asked if they were involved in activities that reinforced their interests or in which they developed new skills or interests. Many participants mentioned something in response to this question, but not all of these responses were related to computers or technology. Of the 5 individuals who were involved in an IT-related activity outside of school or work, all eventually entered an IT career. In addition, 1 person mentioned that his first exposure to computers occurred in a computer programming club in which he was enrolled during primary school. Another individual was involved in a summer camp in which he programmed and controlled robots with a computer. Also, 2 individuals mentioned

video games as a source of exposure or continued involvement in technology, and 1 also played with remote controlled cars and made alterations to them with his friends.

Edward participated in an extracurricular club involving electronic music and hosting social events for other students. When describing why he enjoyed electronic music he related the creation of music to the creation of screen savers, which was the activity that drove his early interest in computers. He said, "Sound is another pattern just like screen savers. There is light and sound and audio and it really has the same love for me." Although electronic music is not often discussed as being related to information technology, several individuals said that they were interested in the creation or production of music. These individuals viewed music production as a creative outlet with which they could utilize their skills in computer technology.

Finally, 7 people, 6 of whom entered IT, mentioned early summer jobs or internships that used or developed their computer skills. In addition, 2 people taught schoolchildren basic information about computers and enjoyed both figuring out how to make computers interesting to others and having the opportunity to teach young children. Others learned new skills, such as graphic arts or how to install a computer network. Overall, extracurricular activities and part-time jobs served to expand the set of possible careers that participants considered and help individuals weigh various career options.

Workplace experiences—Once youth enter career-track jobs, their experiences in the workplace can either solidify their commitment to the field or convince them to pursue an alternative occupation. To understand the situation of the IT job market, we focus here on the negative workplace experiences in IT jobs. Of the 10 participants who were employed in IT at the time of the interview, 7 reported negative workplace experiences, as did both of the women who left the IT field before the interviews were conducted. In addition, 3 participants who at one time had a job in the IT field mentioned negative experiences with coworkers. Crystal found that her colleagues were too competitive; the other 2 participants were frustrated by the lack of enthusiasm or technical knowledge held by their coworkers. Edward was considering leaving his job (but staying in the IT field), partially because of his experiences with coworkers. In reference to his company and workplace experiences, he said,

Their technical department is absolutely horrid. There's not a single person in there who does the computer trade with enthusiasm because they like it. It's all [just] a job to everybody ... I've been inherently struck that the only people I want to work with are those that love to do it [their job/work with computers].

Beyond negative experiences with coworkers, 5 participants had difficulties with their supervisors in IT jobs. At times, supervisors were unsupportive of participants' growth and performance or were too rigid in the way they managed their employees. Although these experiences were not uncommon, no participants suggested that problems with supervisors led them to seek new jobs or careers. There were also several individuals who mentioned positive experiences with their supervisors. Generally, experiences with supervisors in IT jobs did not appear to be systematically different from experiences with supervisors in non-IT fields.

The third kind of complaint about IT jobs was a negative working environment. For participants who worked in a negative environment, their jobs did not allow them to express their personalities or feel comfortable with their social identities. For instance, 1 woman felt as though she couldn't be as "goofy" or lighthearted as she would like to be when she was employed in an IT job. Another man wanted more opportunity to be creative in his tasks at work. Both women who left the IT field reported sexism in their workplaces; in addition, 1

experienced racism and 1 encountered ageism. As an example, when asked whether she enjoyed her previous job in IT, Rachel replied,

Well, there wasn't a lot of gratification in the computer programming thing [job] because it was so natural to me that a lot of people felt I was arrogant. And I wound up getting fired because there were a lot of older people in the company and they didn't like some young woman with no college degree knowing more than they did.

Unfortunately, ageism and racism also appeared in interviews with non-IT professionals, but sexism only appeared in relation to male-dominated careers such as law enforcement. Although only two occurrences of sexism were reported in relation to IT careers, it is important to remember that we interviewed few women who were ever in an IT career (see Table 1). Thus, although we found little evidence for racism and sexism in the IT field, we found enough evidence that it may present a significant hindrance for women and minorities who are employed in IT jobs. In fact, when asked why women are underrepresented in IT, 10 of the 26 participants mentioned that male-oriented classes or career fields (including the IT field) can be intimidating to women or can maintain biased hiring and promotion decisions. In the minds of many participants, women may choose careers in which they will be less likely to encounter sexism or barriers due to their gender.

Discussion

This study sought to examine theorized external influences on individual career development in the context of a specific career field in which both women and members of some minority groups are underrepresented. We considered the supportive and obstructive factors associated with entering and staying in an IT job in an attempt to determine how social supports and contexts continue to influence emerging adults as they enter their career tracks. We found clear evidence that these external influences exist in childhood and adolescence. Furthermore, even though most participants had career aspirations or had made career-related choices by early adulthood, the influence of parents, peers, and others remained salient in their career pathways.

Most of the social influences found across interviews appeared to change in developmentally appropriate ways as participants entered full-time jobs. For instance, parents' messages during childhood centered on general activities; as their children entered adulthood, parents spoke of their expectations and perceptions of specific jobs. Experiences provided by others also changed, from the opportunity to play with computers casually to the opportunity to interview at a particular company. These changes indicated that emerging adults' parents, peers, and significant others do not become less influential in the process of career development. Rather, they continue to play similar roles while adapting their communication and assistance to emerging adults' new circumstances (Arnett, 2004; Whiston & Keller, 2004).

When possible, emerging adults seek jobs and careers that provide self-fulfillment and expression of their identity, often engaging in exploration of such careers through several jobs in a short period of time (Arnett, 2004; Hamilton & Hamilton, 2006). Therefore, it is not surprising that several of the participants in this study had already held multiple jobs in different fields. Experiences in the workplace allowed participants to continue exploring themselves and career fields in meaningful ways, leading to greater satisfaction with career choices (Blustein, Phillips, Jobin-Davis, Finkelberg, & Roake, 1997).

Although workforce experiences were very useful for the career development process, such experiences also appeared to be the one most likely related to underrepresentation of women in IT occupations. On the one hand, actual discrimination may be a cost that leads women

and minorities, like Rachel and Crystal, away from IT jobs. On the other hand, anticipated discrimination may have an even larger impact on individuals' career trajectories (Gottfredson & Becker, 1981). Many individuals discussed the difficulty of choosing a male-oriented career field or the potential for discriminatory hiring and promotion practices in such fields. Workplace barriers and difficulties, either anticipated or actually experienced, are incorporated into emerging adults' career plans and may play a subtle yet powerful role in women's and minorities' career choices.

Career development involves many choices throughout the life span. Unlike some occupations, entry into an IT career path appears to begin quite early, often with direct manipulation of computers and problem solving. Activities, educational experiences, and encouragement from one's social network can persuade individuals to remain on the IT path or in some cases to select another path that is more valued or in which one has more confidence. The study of retrospective accounts of career paths confirms and highlights important contextual aspects of developmental theories. As such, future research in career development might examine occupational changes made by adults and how these are related to life span development.

Children born in recent years are more likely to have computers both at home and at school than were the participants in this study (Bae, Choy, Geddes, Sable, & Snyder, 2000; Parsad & Jones, 2005). However, increased access to computers does not mean that children are engaging with computers in a meaningful way. Rather, children and adolescents often engage in "soft" computing activities (DeBell & Chapman, 2004). They work with user-friendly, preprogrammed software, browse the Internet, and communicate with friends. Although many of the participants in this study (both in the qualitative sample and the larger sample from which it was drawn) had access to computers in their homes or schools during childhood, being exposed to computers was not enough to develop interest in entering a computer-related career. Thus, children who have access to computers may not be engaging with them in ways that will promote the skills needed by the future IT workforce or attract them to computer programming, engineering, or maintenance. Interest in computers and the IT field develops through processes similar to those of other occupational interests. Therefore, engaging educational programs, summer camps, and other opportunities are needed if the IT field seeks a large, diverse workforce in the future.

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Biographies

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Table 1
Pseudonyms of Interviewed Participants, by Type of Career at age 25, Race, and Gender

Type of Job	African American Males	African American Females	European American Males	European American Females
In IT jobs	Ben, Kenny, Sean	Monica	Adam, Dan, Edward, Eric, Michael	Angela
Jobs required significant work with computers but were not IT jobs	Kevin	Amber, Amy, Brandy, Kim, Lauren, Tracy	Jason	Maria, Melissa, Sarah
Jobs did not require significant work with computers	Anthony, James	Crystal ^a	—	Rachel ^a
Not employed	Thomas	—	—	—

^a Participants held IT jobs at one time but were no longer employed in the IT field at the time of their interviews (at age 25).

Table 2
Participants Who Expressed Coded Themes Regarding IT Career Development Experiences

Theme	Name of Participant
Family (parents)	
Being a role model	Amy, Angela, ^a Edward, ^a Eric, ^a Rachel ^b
Provision of opportunities	Adam, ^a Amy, Angela, ^a Anthony, Ben, ^a Dan, ^a Edward, ^a Maria, Monica, ^a Sean, ^a Tracy
Messages about computers/careers	Amy, Kenny, ^a Edward, ^a Kevin, Monica, ^a Sarah, Sean, ^a Tracy
Socioemotional climate/ encouragement	Adam, ^a Amy, Anthony, Ben, ^a Dan, ^a Kenny, ^a Kevin, Maria, Michael, ^a Rachel, ^b Sean, ^a Tracy
Classes and teachers	
Felt capable	Angela, ^a Ben, ^a Eric, ^a Jason, Kenny, ^a Sarah
Challenging courses (positive)	Crystal, ^b Jason, Sean, Thomas
Challenging courses (negative)	Adam, ^a Amy, Angela, ^a Brandy
A chance to solve problems	Adam, ^a Anthony, Angela, ^a Crystal, ^b Dan, ^a Monica, ^a Tracy
First exposure	Adam, ^a Anthony, Jason, Kim, Lauren, Maria
Poor teaching	Edward, ^a Kevin, Rachel, ^b Sarah
Outdated or inadequate curriculum	Angela, ^a Edward, ^a Melissa, Rachel ^b
Other people	
Provision of opportunities; networking	Adam, ^a Angela, ^a Ben, ^a Dan, ^a Edward, ^a Michael ^a
Messages about computers/careers	Angela, ^a Ben, ^a Sean ^a
Socioemotional climate/ encouragement	Angela, ^a Ben, ^a Dan, ^a Edward, ^a Michael, ^a Monica, ^a Sean ^a
Activities	
Extracurricular and games	Ben, ^a Edward, ^a Eric, ^a Kenny, ^a Michael ^a
Early part-time jobs	Adam, ^a Angela, ^a Edward, ^a Kenny, ^a Monica, ^a Sean, ^a Tracy
Workplace	
Bad experiences with supervisors	Adam, ^a Ben, ^a Eric, ^a Michael, ^a Rachel ^b
Bad experiences with coworkers	Crystal, ^b Edward, ^a Rachel ^b
Male-dominated fields could be problematic	Amber, Angela, ^a Brandy, Crystal, ^b Dan, ^a Edward, ^a Jason, Michael, ^a Sean, ^a Tracy

^aParticipants held IT jobs at the time of their interviews.

^bParticipants held IT jobs at one time but were no longer employed in the IT field at the time of their interviews.

Table 3
Cross-Tabulations of Home Computer Access for the Longitudinal Sample (*N* = 574) by Ethnicity and Gender

Computer at home during...		African American Females		African American Males	European American Females	European American Males
Elementary school ^a	Yes	Percentage	30	31	48	49
		Adj. resid	-2.8	-2.7	3.7	2.7
	No	Percentage	70	69	52	51
		Adj. resid	2.7	2.7	-3.7	-2.7
Middle school ^b	Yes	Percentage	45	49	68	68
		Adj. resid	-2.6	-3.5	4.0	3.0
	No	Percentage	55	51	32	32
		Adj. resid	2.6	3.5	-4.0	-3.0
High school ^c	Yes	Percentage	72	70	86	86
		Adj. resid	-3.4	-1.8	3.4	2.9
	No	Percentage	28	30	14	14
		Adj. resid	3.4	1.8	-3.4	-2.9

Note: Percentage refers to the percentage of individuals in each demographic category (i.e., African American females), Adj. resid refers to the adjusted standardized residuals.

^aPearson $\chi^2(3) = 26.85, p < .001$.

^bPearson $\chi^2(3) = 33.09, p < .001$.

^cPearson $\chi^2(3) = 25.62, p < .001$.