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Individualized Learning Plans in Guiding Career-Technical Course-Taking and Achieving Post-High-School Employment Goals

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Abstract
Most adolescents and young adults in the U.S. seek employment after high school regardless of their education or work status, yet career readiness and work preparation have not received equal attention as the college readiness and preparation at the secondary level. Using data from the High School Longitudinal Study of 2009 (HSLS:2009), we explored possible connections between individualized learning plans (ILP) and both secondary Career-Technical Education (CTE) course taking and employment goal attainment in the U.S. Results showed that ILPs were positively associated with establishing employment goals, securing employment, and achieving employment goals after high school. Students who had employment goals were likely to earn more CTE credits and had higher probabilities of working after high school. However, ILPs did not moderate the relationship between employment goals and earned CTE credits, nor moderate the relationship between employment goals and work activities. Findings reflect an overlook of integrated college and career readiness preparation and underutilization of school-based career education resources.
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1. Introduction

Adolescence is a critical stage in individuals' career development (e.g., Jiang et al., 2019; Porfeli & Lee, 2012). In this stage, individuals face developmental tasks such as exploration of self and world of work, clarification of and commitment to career choices, establishment of career goals, career planning, as well as preparation for transitions to adulthood and college/work (e.g., Savickas, 1999; Skorikov, 2007). Secondary schools play an important role in this process, guiding adolescents in academic growth and career development (e.g., Park et al., 2018). Considering adolescents spend most of their time in a school setting, making education relevant to individuals' career aspirations and needs becomes important. Personalized learning, which considers unique characteristics of learners and matches with the best available teaching and learning resources, has thus drawn increasing attention in the last 20 years and the term itself has transformed into multiple layers of meanings (Lee et al., 2018; Shemshack & Spector, 2020). Nonetheless, personalized learning has been shown efficient in increasing learners' motivation, engagement, and learning effectiveness (e.g., Gómez et al., 2014; Lockspeiser & Kaul, 2016).

In the U.S., most adolescents and young adults have immediate employment needs after high school, regardless of their education or work status. According to the U.S. Bureau of Labor Statistics (2018), two-thirds of high school graduates, aged 16 to 24, enrolled in some form of postsecondary education in the fall of 2017. Among those students, 39.8% were simultaneously employed or looking for work. This pattern has been observed globally and largely due to financial needs related to increased college tuition and fees (Creed et al., 2015; Hussar et al., 2020; Perna, 2010). For students not immediately enrolled in postsecondary education, two-thirds were in the labor market (U.S. Bureau of Labor Statistics, 2018). The workforce participation rate for students who dropped out of high school during 2016-2017 was 41.8%. Given a national high school dropout

rate of 15% (McFarland et al., 2020), nearly half of this high school cohort (47.9%) was either employed or looking for employment after completing high school.

Individualized learning plans (ILPs) as a personalized learning strategy are promising in making schooling relevant and helping students achieve college and career readiness (Solberg, 2019; Solberg et al., 2012). It is a customized education plan that takes into consideration of individual characteristics, prior experiences, interests, motivation, needs, and goals (Shemshack & Spector, 2020). An ILP is both a written document and a process that helps students identify postsecondary education and career goals, make courses taking plans, and participate in related activities to develop academic, personal, and social skills (Solberg et al., 2014). As of 2014, 38 states had implemented the use of ILPs as a college and career readiness strategy; 21 states required ILPs for all middle and high school students (Solberg et al., 2014). These plans are reviewed and updated regularly by students, parents, teachers, and counselors. Solberg et al. (2012) found that students with an ILP perceive the relevance of their coursework, and thus, become more engaged in school; parents and teachers are also more involved with the student in goal setting and the decision-making process.

Career and technical education (CTE) is an important component in the U.S. education system that focuses on career development and workforce preparation. At the secondary level, most CTE courses are taken as electives in comprehensive high schools and others are offered in specialized schools, such as career academies (Levesque et al., 2008; Stern et al., 2010). Aligned with industry standards, CTE programing integrates CTE courses, work-based learning activities (e.g., internship), and career and technical student organization activities, and provides students with career exploration and planning opportunities that are critical for lifelong career success. Students will obtain technical knowledge and skills to be job/career ready (Rosen et al., 2018). Student data from Arkansas suggests that taking one additional CTE course above the average increased the probability of being employed after high school by 1.5 percent and elevated quarterly wages by nearly 3 percent (Dougherty, 2016). As high school academic and career curriculum becomes more integrated, the revamped goals of CTE in the 21st century aim to not only provide opportunities for students to explore careers and gain work skills but also prepare them for college and planning for future (Brand et al., 2013).

Since the Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV), individualized learning experiences have also been promoted for students completing CTE courses. The current National Framework of Career Clusters maps out integrated curriculum and activities during high school and shows a continuum that leads to postsecondary education and employment based on students' career aspirations (Advance CTE, n.d.). Suggested academic and CTE courses are organized to align with one or more career pathways within the 16 career clusters that encompass most occupations. Solberg et al. (2012) suggested that the career cluster model of CTE curriculum informs students about relevant skills, activities, and educational pathways for their career goals and should be engaged in ILPs. Fox (2014) further illustrated how the career cluster model can be used in ILPs for the selection of courses and activities to align with students' goals and career fields. To date, few research provides direct evidence on ILPs regarding guiding course selection, personalization, and the effectiveness of ILPs in helping students achieve their goals (Park et al., 2018; Skorikov & Patton, 2007; Solberg et al., 2014). Therefore, this study aims to examine whether ILPs help students select relevant coursework to achieve employment goals.

2. Review of Literature

2.1 Importance of Goals to Achieve Desired Outcomes

Goal intentions (or goals) are self-instructions to achieve certain outcomes or execute particular behaviors. In traditional theories of goal pursuit (e.g., control theory, social cognitive theory, and goal-setting theory), goals are positioned as the most immediate and significant factor to explain attainment (Gollwitzer & Sheeran, 2006). According to goal-setting theory, specific high-level goals direct attention and exert effort toward goal-relevant tasks that lead to high performance (Locke & Latham, 2013). Goals motivate people to mobilize energy, exercise strategies, and increase persistence to perform at the required goal levels. Achievement of goals leads to modified self-efficacy, satisfaction, and further motivation, which, in turn, enhances or prohibits actions toward future goals and subsequent achievement (Dent & Koenka, 2016). Clear goals also contribute to more enthusiasm and greater energy, as well as less anxiety or frustration (Morisano et al., 2010).

Setting a goal is merely the first step in the process of goal attainment. According to the mindset theory of action phases (Gollwitzer, 2012), goal pursuit includes four different consecutive phases: pre-decisional, pre-actional, actional, and post-actional. The pre-decisional phase characterizes commitment to a goal by deliberating the desirability and feasibility of multiple wishes and choosing one to commit. The pre-actional phase maps out an action plan in terms of when, where, and how to implement goal-relevant behaviors. The actional phase marks the actual performance of goal-relevant behaviors by avoiding unwanted influences and contextual threats and conserving flexibility and adaptability toward goal progress. Lastly, the post-actional phase evaluates the goal achievement in terms of degree and quality by comparing what has been achieved with original wishes or, at times, effortful disengagement from the goal. The results of such evaluation provide

valuable feedback for determining the feasibility and desirability of future actions.

Research supports the positive influence of goals on implementing courses of action to achieve goals and eventual goal attainment. For example, Knaggs et al. (2015) found that students with clear and realistic goals in school were likely to have plans of action to achieve those goals. Gollwitzer and Sheeran (2006) conducted a meta-analysis of 94 independent tests and found that implementing actions toward goals had a positive effect on goal attainment with a medium to large effect size (d = .65). Goals and self-regulated learning can be particularly important for students with special needs to achieve their career and educational goals (e.g., Wei et al., 2016).

2.2 How ILPs Contribute to College and Career Readiness

In the U.S., individual states use various names for ILPs (e.g., Education and Career Action Plan, Individual Career and Academic Plan, Student Success Plan), yet the generic term ILP refers to both a document and a process (Solberg et al., 2018). As a document, ILPs record students' course-taking and postsecondary plans and specific college and career readiness skills to develop during the program of study. As a process, ILPs engage students, parents, teachers, and school counselors in the development and implementation of plans to address students' academic and career goals and exploration and management skills for themselves and for careers. ILPs serve as roadmaps that reflect students' unique interests and needs and prepare them to achieve postsecondary and career goals with a seamless transition to college, further training, or employment (Solberg et al., 2014, 2018).

Computer-assisted career guidance system (CACGS) is an important component of the ILP process, providing a web-based platform that shares information among students, parents, counselors, and teachers, and a one-stop service for career assessment, academic and career planning, and resource sharing. For example, students can take career assessment inventories through CACGS and use the test results to identify interested careers; resources in the system will further inform students about those careers and educational requirements, which in turn assists students in decision-making and planning; and the plan itself will record and track students' goals, course taking, and activities, which will be accessible to parents, teachers, and counselors. CACGS has been shown to be efficient and cost-effective in information searching, delivery, assessment, and decision-making, and thus, supports career exploration and planning in school-based career development (Garcia et al., 2021; Gati & Asulin-Peretz, 2011; Sampson Jr. & Osborn, 2015).

ILPs positively support college and career preparation efforts by bridging the gap between the relevance of high school courses and future college and career goals (Solberg et al., 2014). Previous research has shown that interventions can increase the perceived relevance of secondary tasks, goals, and coursework that then increase participants' effort, interest, and overall performance (Hulleman & Harackiewicz, 2009). ILPs include students' intentions for specific postsecondary plans so that they have the autonomy to select courses and consider new and different career options. Brown and Krane (2000) conducted a meta-analysis regarding components of successful career interventions and concluded that written exercises, individual feedback, information about careers, modeling, and support building were key components for stronger career choice interventions. When more of these components are used in an intervention, the magnitude of the effect is larger. ILPs incorporate multiple components, such as individual feedback, information about careers, and support network, so that it can help students, educators, and family members articulate their academic and career plans.

ILPs increase students' academic aspirations toward college and career goals and engage them in the planning process for life after high school (Welsh, 2005). The use of an ILP has been associated with significantly increased student engagement in high school (Plasman, 2018). Students who were more engaged in school were likely to be more motivated, have higher academic and career search self-efficacy, earn higher grades, exhibit better management of stress and health, and demonstrate career decision-making readiness (Solberg et al., 2010). ILPs also help students develop their interests, values, and skills for career planning and management that are necessary for future employment (Rennie Center for Education Research & Policy, 2011; Solberg et al., 2012).

ILPs also engage educators and family members in the college and career readiness planning and preparation process. Solberg et al. (2014) conducted a longitudinal study and used a variety of research methods (e.g., policy analysis, survey, action research) to first understand how ILPs were implemented and then to determine the effectiveness of ILPs in improving college and career readiness outcomes. They found that 85% of 1,400 family members and 67% of 525 educators indicated that ILPs assisted in understanding how to prepare students to be ready for their chosen college and career paths. ILPs led to better communication among relevant stakeholders and helped to establish connections between school and families (National Collaborative on Workforce and Disability for Youth, 2014; Skaff et al., 2016).

2.3 CTE and ILPs in Preparing College- and Career-Ready Graduates

It is important for every student to gain an adequate level of academic proficiency, learn to apply academic knowledge in the workplace, and develop employability skills (e.g., critical thinking, problem solving) to

become college and career ready (Mishkind, 2014). Although academic and CTE courses prepare students for both college and career, CTE coursework plays a unique role in connecting students' career goals with employment outcomes. Associate's degrees or certificate programs focus on technical training that directly links to specific occupations (Visher & Stern, 2015). Xing et al. (2020) found that students who planned to enroll in an associate's degree or certificate program after high school were likely to take more CTE credits during high school than those who planned to enroll in a bachelor's program. CTE students have significant lower drop-out rates in general and increased employment outlook for certain groups (Howard et al., 2022). A higher proportion of CTE students (i.e., taking three or more CTE credits) than non-CTE students expressed clearer course taking plans, made plans for or already gathered information about occupations of interest, and participated in activities, internships, or work to help decide the kind of job desired in the future (Mobley et al., 2017).

Research also suggests positive links between concentration (i.e., taking three or more CTE courses) in an occupation area and job attainment after high school. Arkansas high school students who concentrated in CTE were slightly (i.e., one percentage point) more likely to be employed after high school than non-concentrators (Dougherty, 2016). Dougherty et al. (2018) found that students with disabilities who participated in CTE programs were more likely to graduate from high school on time and earn industry-recognized certificates compared to students with similar disabilities but did not participate in CTE. Studies using the National Longitudinal Transition Study-2 (NLTS2) showed that concentration in a specific occupational area had positive effects for students with disabilities for full-time employment after high school (I. H. Lee et al., 2016; Wagner et al., 2017).

2.4 Purpose of the Study

CTE and ILPs play an important role in school-based career education and share a similar mission of providing students with a personalized learning experience to achieve college and career readiness. Despite the established link between ILPs and academic motivation and school engagement, few studies have demonstrated the role of ILPs in recommending courses to achieve individual goals or in preparing for careers. Considering the claimed role of ILP in connecting goals with course taking and the unique role of CTE in career preparation, this study aimed to examine whether relevant ILP components moderate the mediated relationship between employment goals and outcomes via CTE course taking. We anticipated two hypotheses that having an ILP with a career component (i.e., a career ILP) resulted in taking more CTE courses (total or specialized) and securing employment for students who planned to seek employment after high school (see Figure 1).

H1: A career ILP moderates (strengthens) the indirect effect of employment goals on postsecondary work activities through the total number of CTE credits earned in high school.

H2: A career ILP moderates (strengthens) the indirect effect of employment goals on postsecondary work activities through the number of CTE credits earned in a single occupational area of expressed interest.

3. Method

3.1 Data and Sample

The HSLS:2009 public data set was used for analysis. The HSLS:2009 adopted a two-stage sampling process that randomly selected eligible high schools in the U.S. and then randomly selected students from those schools. The first wave of data collection included a nationally representative cohort of 9th graders in the fall of 2009 (base year). The second wave of data followed up the cohort when they were in the 11th grade in the spring of 2012 (first follow-up). The third wave of data was collected when most students had graduated from high school in the fall of 2013. Students' high school transcripts were also collected in the same year (the Updates). The fourth wave of data occurred when students were engaged in the workforce and/or higher education during the 2016-2017 academic year (second follow-up).

The sample for our analysis included students who attended public high schools in the U.S. and participated in the first three waves of data collection (n=12,361). The sample included 6,195 (50.1%) young men and 6,166 (49.9%) young women. A majority of the sample were White students (n=6,918; 56.0%), followed by Hispanic students (n=1,926; 15.6%), Black students (n=1,234; 10.0%), multi-racial students (n=1,104; 8.9%), Asian students (n=1,045; 8.5%), and students in an "Other" category (i.e., American Indian, Alaska Native, Native Hawaiian, and Pacific Islander; n=134; 1.1%).

3.2 Measures

Table 1 lists all variable names, descriptions, and HSLS:2009 labels we used. Work activity after high school was measured by a survey item in the 2013 Updates that asked participants to indicate activities they engaged in during the fall of 2013, including taking college classes, participating in an apprenticeship program, working for pay, serving in the military, starting a family, attending high school (or homeschool), and taking a course to prepare for the GED or other equivalency exam. Students could respond yes, no, or don't know to each activity. Work activity, a binary variable, was coded as 1 if students responded yes to working for pay, participating in an

apprenticeship program, or serving in the military and coded as 0 if students either did not respond or responded "no" to each activity (the reference group).

The variable, employment goal, was measured by a base-year survey item that asked students in the 9th grade to indicate what they planned to do the first year after high school. Students could check multiple activities including enroll in an associate's degree program, enroll in a bachelor's degree program, obtain a license or certificate in a career field, attend a registered apprenticeship program, join the armed services, get a job, start a family, travel, do volunteer or missionary work, and not sure what you want to do. Employment goal, a binary variable, was coded as 1 when students indicated their goals were to attend a registered apprenticeship program, join the armed services, or get a job and coded as 0 for other listed activities.

The total number of CTE credits earned in high school (CTE_total) was measured by a composite HSLS:2009 variable. The first two digits of the School Courses for the Exchange of Data (SCED) code were used to differentiate academic, CTE, and nonacademic non-CTE courses. CTE courses included technical courses with SCED code starting with any number between 10 and 21 and career exploration and development courses with SCED codes: 22151:22153 and 22201:22249 (Ingels et al., 2015). The number of CTE credits earned in a single occupational area of greatest student interest (CTE_single) was measured by taking the maximum value of existing composite variables in HSLS:2009 that recorded CTE credits in 12 areas. These areas are computer/informational sciences, communication, business, manufacturing, health sciences, public services, hospitality and tourism, architecture/ construction, agriculture, food, and natural sciences, human services, transportation, and engineering/engineering technology. CTE_total scored ranged from a minimum of 0 to a maximum of 12. CTE_single scored ranged from a minimum of 0 to a maximum of 7.

Access to an ILP was indicated by a base-year survey item that asked students if they had an ILP in the 9th grade containing an education component, a career component, or both. The education and career components addressed students' academic preparation and career development, respectively. Career ILP, a binary variable, was coded as 1 when a career component was present and -1 when a career component was absent or an ILP was not available.

3.3 Data Analysis

Missing data were evaluated and treated to avoid adding potential bias to the analysis. The percentage of missing values for each variable in this study was less than 5%, which can be viewed as negligible (Jakobsen et al., 2017). Therefore, listwise deletion was used to treat missing data given its advantages of being simple to compute (Cheema, 2014). A total of 512 (4.1%) cases with missing values were deleted from further analysis, resulting in a final sample size of 11,849. Descriptive statistics (e.g., frequencies and percentages) were used to describe students' goals, CTE credits, and activities given whether they had a career ILP or not. Appropriate analytic weight was used to represent all U.S. 9th graders in the year of 2009. Chi-square tests of independence were conducted to investigate if work activity after high school varied based on employment goal in 9th grade.

Students' work activity, employment goal, career ILP, and CTE_total were used to examine the first hypothesis. Work activity, employment goal, career ILP, and CTE_single were used to examine the second hypothesis. To test all hypotheses, moderated mediation analyses were conducted using Edwards and Lambert's (2007) framework of moderated path analysis. Moderated mediation refers to a mediated effect that varies when a moderator variable has different values. Specifically, the first stage and direct effect moderation model in Edwards and Lambert's framework was used to examine whether the first-stage indirect effect and the direct effect of employment goal on work activity after high school varied by having a career ILP or not. Edwards and Lambert's framework has advantages over Baron and Kenny's (1986) moderated causal steps approach and could delineate moderation and mediation relationships among variables more clearly (Guarana & Hernandez, 2016; Liu et al., 2012). The bootstrap method was used to obtain estimates and confidence intervals for conditional indirect, direct, and total effects (given ILP was available or was not available), because it could account for the non-normality of the effect distribution when the outcome variable is binary (Muthén, 2011).

Data were analyzed using Mplus 7.4. Structural equation modeling (SEM) with Mplus was used to clarify the mediating effect of CTE credits and the moderating effect of ILP between employment goal and work activity after high school. SEM was used because it can accommodate a mixture of different types of variables (e.g., categorical versus continuous, latent versus observed) and has advantages over regression when examining the interrelations among exogenous, mediating, moderating, and endogenous variables (Muthén & Asparouhov, 2015). The mediating effect was evaluated by the significance of indirect, direct, and total effects based on bootstrapped estimates and confidence intervals (simulation=5,000). The moderating effect was evaluated by the significance of the interaction effect of employment goal and ILP status on CTE credits.

4. Results

4.1 Descriptive Statistics

Two-thirds of 9th grade students (n=8,087; 68.3%) indicated that they had plans to enroll in some type of

postsecondary education program (e.g., certificate, associate's degree, or bachelor's degree). Almost half of the sample (n=5,645; 47.6%) also expressed plans to seek employment after high school completion. During the fall of 2013 (the academic semester immediately following high school completion), approximately 72% of the sample enrolled in postsecondary education classes, while 60% were working during the same period of time. About 62% of our sample (n=7,396) reported having had an ILP in 9th grade. A slight majority of ILPs (n=4,262; 57.6%) included both education and career components, 22.8% of ILPs (n=1,686) only contained an education component, and 19.6% of ILPs (n=1,448) only contained a career component. Parents were most likely to help students develop an ILP (n=2,570; 34.7%), followed by the student alone (n=1,946; 26.3%), multiple people (n=1,851; 25.0%), and counselor, teacher, or others (n=1,029; 13.9%). The average number of total CTE credits completed during high school was 3.20, while the average number of CTE credits in a single area of expressed interest was 1.61.

Chi-square tests of independence indicated that significant associations existed among career ILP, 9th grade employment goal, and work activity after high school. Table 2 provides cross tabulations of students' work activity by employment goal conditional on the presence or absence of an ILP with a career component. The number of students with an employment goal in 9th grade increased by 5 percent (45.33% to 50.12%) when a career ILP was present in grade 9, indicating a positive association between a career ILP and declared employment goal. Likewise, the number of students working after high school increased by 5 percent (57.13% to 62.36%) when a career ILP was developed in the 9th grade, indicating a positive association between these two factors. Finally, the number of students with early goals for employment who reported working after high school increased by 5 percent (29.13% to 34.01%) when a career ILP existed in the 9th grade. This finding indicates a positive association between the development of a career ILP and the match of employment goals and actual work activity after high school.

4.2 Moderation Analysis

Hypothesis 1 examined the statistical significance of conditional indirect and moderation effects, respectively. The possible mediation effect of CTE participation (measured by CTE credits earned) between students' employment goal and postsecondary work activity was first examined. Table 3 provides parameter estimates obtained through the moderated path analysis. Path coefficients were significant from employment goal to (a) CTE_total and (b) CTE_total to work activity. Table 4 displays bootstrap estimates and confidence intervals for conditional direct and indirect effects of employment goals on work activity through CTE_total. Bootstrapping confidence intervals revealed a conditional indirect effect of CTE_total that was significantly larger than 0 when a career ILP was not in place, but was not significantly different from 0 when a career ILP was in place. Even so, the difference between these two conditional indirect effects was not significantly different from 0, indicating that the total number of CTE credits had a significant mediation effect between students' early employment goal and subsequent work activity. Students who planned to seek employment after high school were more likely to take more CTE credits, which, in turn, increased their probabilities of working after high school. While significant, the magnitude of these mediation effects was relatively small.

The moderation effect of a career ILP was determined by examining the interactive effects of employment goals and career ILP on (a) CTE_total and (b) work activity in the first stage and direct effect moderation model. The interaction effects of employment goal and career ILP were not statistically significant for either CTE_total or work activity (see Table 3). Development of a career ILP did not moderate the relationship between either (a) employment goal and total number of CTE credits taken or (b) employment goal and work activity. Therefore, research hypothesis 1 was not supported.

The same analysis procedures were used to test research hypothesis 2. The resulting coefficient for the employment goal to CTE_single path was not statistically significant, but the path from CTE_single to work activity was significant (see Table 3). Bootstrapping confidence intervals indicated that the conditional indirect effects of CTE_single were not significantly larger than 0 regardless of the presence or absence of a career ILP (see Table 4). Thus, the number of CTE credits taken in a single occupational area did not mediate the relationship between students' employment goals and their work activity.

Because the path coefficient from employment goal to work activity was significant, a simple moderation model was analyzed to determine the possible interactive effects of employment goal and career ILP on work activity. However, results did not reveal a statistically significant interaction effect. In other words, the presence (or absence) of a career ILP did not moderate the relationship between employment goal and work activity. Therefore, research hypothesis 2 was not supported.

5. Discussion

5.1 Interpretation of Results

To address the under-evaluated topic of school-based career education (Park et al., 2018; Skorikov & Patton, 2007), we examined the synergy of CTE and ILP in customizing learning experience and preparing students for

employment after high school in the U.S. Specifically, we explored the role of ILPs in connecting students' employment goals with both secondary CTE course taking and postsecondary work activities using a nationally representative dataset of students from public high schools in the U.S. About 50% of our sample indicated intentions to seek employment after high school when they were in 9th grade. Sixty percent of the cohort secured a job, attended a registered apprenticeship program, or joined the armed services in the first fall after projected high school graduation. In contrast, about 70% of the cohort indicated intentions of college enrollment in 9th grade and were enrolled in college classes four years later. This finding aligns with the global trend of combining postsecondary education with working to ease financial burdens (Creed et al., 2015; Hussar et al., 2020; Perna, 2010). Although employment may not be those students' primary focus after high school, career exploration and preparation in high school can be instrumental in helping them seek and secure employment later in life.

We found the total number of CTE credits earned in high school mediates the relationship between students' employment goals and work activities, with clear employment intentions resulting in earning more CTE credits and subsequent increased probabilities of working after high school. This finding confirms that CTE is instrumental to career planning and development and extends our knowledge about CTE course taking. That is, CTE course taking not only has positive associations with setting employment goals or obtaining an employment (Dougherty, 2016; Mobley et al., 2017; NCES, 2019) but also connects goals and outcomes through specific plans of actions. Consistent with the broader goal- setting and attainment literature, goals that are explicit often enhance plans of action to achieve those goals (e.g., Knaggs et al., 2015; Locke & Latham, 2013); goals and action implementation, together, contribute positively to the attainment of goals (Gollwitzer & Sheeran, 2006).

Despite the link among employment goals, work activities, and the total number of CTE credits taken, mediation effect was not found with the number of CTE credits earned in a single occupational area of greatest student interest. Previous studies (e.g., Dougherty, 2016; Lee et al., 2016; Wagner et al., 2017) established the connection between the number of CTE credits taken in a single occupational area with students' short-term employment outcomes (e.g., wage, full-time employment). The lack of mediation in this finding implies a weak link between general employment intentions (i.e., obtaining an employment after high school), the variable used in this study, and earning more CTE credits in student interested occupational area (i.e., intentional concentration in a specific area). This might be because of different reasons students take CTE courses: to explore different careers of interest and to gain skills in a specific area (Advance CTE, 2021). These two reasons reveal that students may be at different stages in their career exploration. Due to restrictions of using data source that was pre-existed, we could not have more insights on student career/employment goals. Thus, it is unclear how specific or crystalized students' goals are. Further mixed-method research investigation is needed to examine this topic.

We found that having a career ILP was positively associated with successfully setting an employment goal in 9th grade, obtaining an employment, and achieving the employment goal after high school. This finding reflects a positive influence associated with the career component of an ILP on goal setting, employment, and goal attainment, which supports the notion that ILPs help students identify goals as well as locate and secure employment (Solberg et al., 2012). However, the moderation effect of a career ILP was not found between employment goals and the number of CTE credits earned (in total or in a single area), nor moderation effect was found between employment goals and work activities. It shows that the career component of an ILP did not strengthen (nor weaken) the relationship (a) between goals and CTE course taking nor (b) between goals and outcomes. This finding does not align with our understanding of the role ILPs play in assisting students to select useful coursework and pinpointing the relevance of those courses in helping them achieve their goals (e.g., Hulleman & Harackiewicz, 2009; Solberg et al., 2014). In addition, it does not show the synergy that ILPs and CTE could have created in preparing students to achieve their goals, at least not in the way we proposed.

Research shows that discrete career preparation activities (e.g., career day, internship, career-related jobs) did not significantly influence students' immediate education and work attainment after high school (Xing et al., 2019). However, these activities increased students' engagement, assisted on-time completion (Xing & Gordon, 2021), and were likely to influence students' employment outcome in the long term. Compared to discrete career interventions or activities, CTE coursework offers students a more holistic learning experience featuring work-based learning, leadership development, and career exploration and planning, and thus, has a more prominent and direct influence on students' immediate employment outcomes after high school (e.g., Dougherty, 2016; Dougherty et al., 2018; Lee et al., 2016; Mobley et al., 2017; Wagner et al., 2017). CTE coursework is also part of graduation requirements in many states. That said, it was surprising a career ILP did not assist in the selection of CTE courses. Skaff et al. (2016) reported a common perception from parents that ILP goals were not well matched with students' interests and abilities, which causes question to personalization. With academic courses still being the main body of high school curriculum and preparing students for college being the primary goal of U.S. secondary education, it is possible that CTE courses are overlooked by school career counselors and easily replaced by other alternatives in the ILP. It is also questionable whether career counselors, from whom students and parents receive guidance, have adequate knowledge about the career cluster framework and how it maps out

the educational journey for students with integrated college and career preparation that paves meaningful pathways to occupations.

As the first study to examine personalized career planning, course taking, and employment preparation at the secondary level, this study examined on a national scale whether ILPs guided CTE course taking and moderated between employment goals and outcomes via CTE course taking. Further investigations are needed to explore a) the extent of the personalization of ILP in practice, b) the implementation of ILPs with adequately prepared personnel and knowledge about the career cluster framework, and c) specific mechanisms for course selection and effectiveness of ILP regarding direct academic and career achievement outcomes. Mixed-method studies at the local scale seem more appropriate for these inquiries. Specifically, considering the four consecutive phases of goal pursuit (Gollwitzer, 2012), ILPs ought to play different roles in each phase of goal achievement. For example, ILPs need to help students clarify goals based on their unique interests and needs (pre-decision), recommend an individualized plan of action for course taking and co-curricular activities (pre-action), provide guidance and support to students during the course of action (action), and regularly evaluate students' achievement and future plans of action (post-action). Understanding specific working mechanisms and efficacy of ILPs in each phase of goal pursuit as well as how well ILPs serve individual needs as a personal learning plan and the role of key personnel plays in this process is important. Such investigations will expand our knowledge of ILPs and guide practice to better prepare students for college and careers.

5.2 Implications for Practice

Given the increasing discrepancy of socioeconomic benefits between a high school diploma and a college degree, high schools have focused primarily on preparing students for a successful transition to postsecondary education. However, college and work are no longer a single-choice option when students graduate from high school. In fact, over half of high school graduates have immediate needs to seek employment after high school. Therefore, the original college-first mindset depicting a linear roadmap (i.e., high school–college–career) may not serve individual needs well. Instead, ILPs should be a roadmap that provides preparation for different possibilities after high school (i.e., high school–college and career). State regulations should be as specific as possible in terms of what components, support services, as well as formative and summative measures are included in an ILP in its document and process form, respectively, to ensure adequate preparation for both college and career.

CTE courses play a value-added role in college and career preparation and should be more accessible to all students. It is critical to increase general school counselors' knowledge of the curriculum framework of career clusters and pathways (Advance CTE, n.d.; Fox, 2014) and how CTE courses are relevant to postsecondary education and employment options given the framework. Only when counselors have solid knowledge of the importance of CTE courses, students and their parents are likely to be aware of these options and understand. For example, counselors could instruct students to identify their desired occupations using the career interest and cluster inventories and figure out what levels of education and training are required to enter the desired career field. When students' desired occupation requires a bachelor's degree or beyond, CTE courses and activities are recommended for exploration purposes; when the desired occupation requires education no more than an associate degree, a sequence of CTE courses and work-based learning activities should be recommended for training purposes. Mapping out the curriculum alignment at secondary and postsecondary levels is also helpful for students to understand their education and career trajectories.

5.3 Limitations and Conclusions

The findings of this study should be interpreted with consideration of a few limitations. First, using an existing dataset of HSLS:2009, we focused on the access to an ILP and effectiveness toward CTE course-taking and employment goal achievement in general. Data and variable measures come from an existing dataset, researchers have limited control in terms of availability and robustness of measures. Second, we developed our hypotheses based on goal pursuit theories and the consistently claimed role of ILPs from existing literatures. These hypotheses represent the most likely mechanism that we believed to be true and yet such mechanism has not been proved. More investigations are needed to continue exploring mechanisms, benefits, and efficacies of various aspects of ILPs and to what extent CTE plays a role in this process.

Despite these limitations, this study employed a longitudinal dataset and revealed students' needs for employment at the national level. This study is also one of the few quantitative studies that evaluates the effectiveness of ILP and discusses school-based career education and development on a large scale using national data. In addition, this study explored how a career ILP could guide CTE course taking and help students achieve employment goals. Although the proposed hypotheses were not fully supported, discussion of findings provide specific directions for future inquires. Implications of this study provide important guidance for practice. As a promising intervention to college and career readiness and a roadmap to future success that involves multiple parties and stakeholders, the role and efficacy of ILPs certainly deserves further consideration.

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Table 1. List of study variables

Variable name	Description	HSLS:2009 label
Outcome variables		
Work activity after high school	Student was working in fall 2013; 1 = yes, 0 = no	Recoded from S3WORK S3APPRENTICE S3MILITARY
Independent variables		
Employment goal	Student planned to seek employment after high school; 1 = yes, 0 = no	Recoded from S1FYJOB S1FYAPPR S1FYMILITARY
Moderating variables		
Career ILP	Student had an ILP with career component in 9th grade; 1 = yes, –1 = no	Recoded from S1PLAN
Mediating variable		
CTE_total	Total number of CTE credits taken in high school(continuous)	X3TCREDCTE
CTE_single	Total number of CTE credits taken in single occupational area where student showed most interest	Recoded from X3TCREDCOMPSCI X3TCREDCOM X3TCREDBUS X3TCREDMANU X3TCREDHELSCI X3TCREDPUBSER X3TCREDTOUR X3TCREDARCH X3TCREDAG X3TCREDHUMSER X3TCREDTRANS X3TCREDENGIN

Table 2. Work activity by employment goal conditional on Career ILP

Working status	Had employment goal				Total	
	No		Yes			
	N (%)	Weighted N (%)	N (%)	Weighted N (%)	N (%)	Weighted N (%)
Career ILP was not available						
Not working	1,637	448,593	995	292,359	2,632	740,952
	(26.67)	(25.53)	(16.21)	(16.64)	(42.87)	(42.16)
Working	1,719	505,220	1,788	511,280	3,507	1,016,500
	(28.00)	(28.75)	(29.13)	(29.09)	(57.13)	(57.84)
Total	3,356	953,813	2,783	803,639	6,139	1,757,452
	(54.67)	(54.27)	(45.33)	(45.73)		
Career ILP was available						
Not working	1,229	316,719	920	265,124	2,149	581,842
	(21.52)	(18.91)	(16.11)	(15.83)	(37.64)	(34.73)
Working	1,619	479,059	1,942	614,369	3,561	1,093,428
	(28.35)	(28.60)	(34.01)	(36.67)	(62.36)	(65.27)
Total	2,848	795,777	2,862	879,493	5,710	1,675,270
	(49.88)	(47.50)	(50.12)	(52.50)		

Table 3. Parameter estimates from moderated path analyses

	Hypothesis 1		Hypothesis 2	
	CTE_total	Work activity	CTE_single	Work activity
Employment goal	0.127**	0.499***	0.029	0.504***
Career ILP	0.165***	0.102***	0.074***	0.108***
Employment goal*Career ILP	-0.048	-0.030	-0.011	-0.032
CTE_total/single		0.071***		0.069***

Note. *p<0.05, **p<0.01, ***p<0.001.

Table 4. Unstandardized bootstrap estimates and confidence intervals for conditional direct and indirect effects of student goals on student activities through course credits

Mediator	Direct effect	Odds ratio of direct effect	Indirect effect	Odds ratio of indirect effect
CTE_total				
Yes	0.469 (0.379, 0.561)	1.599 (1.460, 1.753)	0.006 (-0.002, 0.014)	1.006 (0.998, 1.014)
No	0.529 (0.441, 0.617)	1.697 (1.555, 1.854)	0.012 (0.005, 0.021)	1.013 (1.005, 1.021)
DIFF				-0.003 (-0.009, 0.002)
CTE_single				
Yes	0.471 (0.380, 0.563)	1.602 (1.463, 1.755)	0.001 (-0.003, 0.006)	1.001 (0.997, 1.006)
No	0.536 (0.448, 0.625)	1.709 (1.566, 1.867)	0.003 (-0.001, 0.007)	1.003 (0.999, 1.007)
DIFF				-0.001 (-0.004, 0.002)

Note. DIFF = difference between indirect effects when a career ILP was or was not in place. 95% confidence intervals are in parentheses.

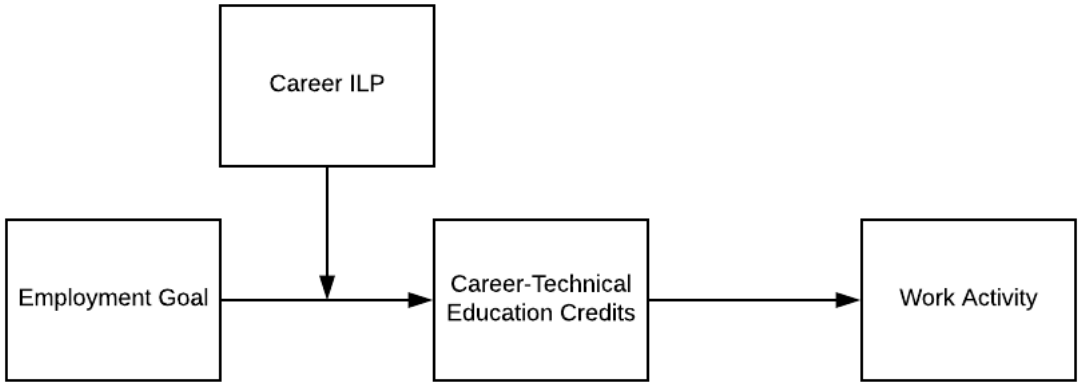

Figure 1. Moderated mediation.