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Linking career exploration and decision self-efficacy to career engagement: a sequential mediation model of career adaptability and career calling

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Abstract
In the current dynamic employment environment, individuals require personal resources to navigate unforeseen career challenges. This study investigates the relationship between career exploration and decision self-efficacy and career engagement, with career adaptability and career calling serving as sequential mediators. Data were gathered from 211 university students in Turkey employing a time-lagged approach. Structural equation modeling demonstrated that the relationship between career exploration and decision self-efficacy positively impacts career engagement and was sequentially mediated by career adaptability and career calling. The findings provide practical implications for higher education institutions and career counseling practices.

Keywords Career exploration and decision self-efficacy · Career engagement · Career adaptability · Career calling

Résumé
Dans l'environnement professionnel actuel, caractérisé par son dynamisme, les individus ont besoin de ressources personnelles pour faire face aux défis imprévus de leur carrière. Cette étude examine la relation entre l'exploration de carrière, l'auto-efficacité décisionnelle et l'engagement professionnel, avec l'adaptabilité de carrière et la vocation professionnelle comme médiateurs séquentiels. Les données ont été recueillies auprès de 211 étudiants universitaires en Turquie selon une approche à décalage temporel. La modélisation par équations structurelles a démontré que la

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relation entre l'exploration de carrière et l'auto-efficacité décisionnelle a un impact positif sur l'engagement professionnel, et qu'elle est médiatisée de manière séquentielle par l'adaptabilité de carrière et la vocation professionnelle. Les résultats offrent des implications pratiques pour les établissements d'enseignement supérieur et les pratiques d'orientation professionnelle.

Zusammenfassung

Im gegenwärtigen dynamischen Beschäftigungsumfeld benötigen Individuen persönliche Ressourcen, um unvorhergesehene berufliche Herausforderungen zu bewältigen. Diese Studie untersucht den Zusammenhang zwischen beruflicher Exploration sowie Entscheidungs-Selbstwirksamkeit und beruflichem Engagement, wobei berufliche Anpassungsfähigkeit und Berufung als sequenzielle Mediatoren fungieren. Die Datenerhebung erfolgte mittels eines zeitversetzten Ansatzes bei 211 Studierenden in der Türkei. Die Strukturgleichungsmodellierung zeigte, dass der Zusammenhang zwischen beruflicher Exploration und Entscheidungs-Selbstwirksamkeit einen positiven Einfluss auf das berufliche Engagement hat und dabei sequenziell durch berufliche Anpassungsfähigkeit und Berufung vermittelt wird. Die Ergebnisse liefern praxisrelevante Implikationen für Hochschulen und die Berufsberatung.

Resumen

En el actual entorno laboral dinámico, las personas requieren recursos personales para afrontar desafíos profesionales imprevistos. Este estudio investiga la relación entre la exploración de carrera y la autoeficacia en la toma de decisiones profesionales y el compromiso con la carrera, considerando la adaptabilidad profesional y la vocación profesional como mediadores secuenciales. Se recopilaron datos de 211 estudiantes universitarios en Turquía utilizando un enfoque de medición temporal diferida. El modelado de ecuaciones estructurales demostró que la relación entre la exploración de carrera y la autoeficacia en la toma de decisiones profesionales impacta positivamente en el compromiso con la carrera y está mediada secuencialmente por la adaptabilidad profesional y la vocación profesional. Los resultados ofrecen implicaciones prácticas para las instituciones de educación superior y las prácticas de orientación profesional.

Introduction

The career journey is an evolving nonlinear phenomenon, characterized by fluctuations, and occasionally necessitates reevaluation and a shift toward a completely different path. In an era driven by rapid change, the volatile and unpredictable nature of organizations and labor markets necessitates that individuals, as the principal agents in career development and management, consistently adapt (Greenhaus et al., 2018; Hirschi & Koen, 2021). Consequently, at various career stages, individuals require a comprehensive toolkit to navigate the problems they face and the new paths they might explore. Self-efficacy constitutes an important asset, especially within the career domain, as it denotes individuals' confidence in their capacity to take the

most effective actions related to career exploration and decision-making (Lent et al., 2017). The social–cognitive model of career self-management (Lent & Brown, 2013) recognizes self-efficacy as a critical determinant of career outcomes. Empirical research indicates that career exploration and decision self-efficacy (CEDSE) could positively affect both career-related outcomes and broader, long-term life outcomes (Brown & Lent, 2019; Doğanülkü & Korkmaz, 2025). Also, career engagement (CE) has a close connection to self-efficacy since it involves proactive career activities, including seeking employment, planning, networking, and development (Hirschi et al., 2014). Individuals with strong self-efficacy experience fewer difficulties in developing the belief required for taking action. From this viewpoint, self-efficacy significantly influences adaptive behaviors, helping to overcome challenges faced during one's employment and motivating individuals to achieve their career aspirations.

Career construction theory (CCT; Savickas, 2012) conceptualizes career as a dynamic process, positioning the individual as the primary agent. It points out the necessity of environmental adaptation during the transition into the occupational domain and throughout career construction, thus emphasizing the significance of career adaptability (CA) for today's workforce. CA represents an individual's readiness to confront diverse conditions faced during their career, address problems, overcome obstacles, and, when required, adjust accordingly. In this context, CA is a needed ability for individuals at almost every career stage within work environments shaped by digitalization, diverse labor markets, and changing organizational structures (Rossier et al., 2017). In career development and management, an individual's intrinsic sense of meaning holds a unique significance. The notion of career calling (CC), which signifies a sense of purpose and meaning in one's career, has been found to be associated closely with CA and various career outcomes for individuals both during the transition from school to work and in active employment (Duffy et al., 2014; Hall & Chandler, 2005; Praskova et al., 2015). CC has the capacity to positively influence career satisfaction, career success, and career-related actions (Jiang et al., 2023). Furthermore, clarifying the mechanisms that link self-efficacy and CE in young adults during the school-to-work transition, a phase characterized by increased career anxiety and stress, could improve comprehension of this process.

Recent European labor market data reveal that, although unemployment rates for university graduates are often lower than those of the general population, Turkey represents a notable exception, exhibiting higher unemployed rates among individuals with tertiary education. Turkey is followed by Greece, Spain, and Serbia regarding higher unemployment rates among university graduates (EuroNews, 2025). This pattern shows the increased uncertainty regarding the school-to-work transition for university students in Turkey. The transition from higher education to employment constitutes a pivotal phase where individuals confront career-related stress, uncertainty, and increased demands for employability. Also, examining the relationship between CEDSE and CE during the school-to-work transition is particularly important in countries such as Turkey, where career development practices are still in the early stages of systematic implementation thus resulting in career stress among university students remains high (Gerçek & Özveren, 2025). Despite the knowledge on the relationship between self-efficacy and proactive career actions, the mechanisms

by which CEDSE leads to sustainable CE are not yet entirely understood. This study explains the sequential mediating roles of CA and CC in the transformation of self-efficacy into career actions during the early career stage. This approach expands upon recognized career development models and offers effective perspectives for career education and counseling, particularly in environments that have recently developed structured career support systems. The findings are anticipated to offer directions for higher education institutions, career psychologists, career counselors, and young adults.

Theoretical background

Career exploration and decision self-efficacy, and career engagement

Career is almost like a journey, in which people discover the most appropriate paths, make decisions to change routes, and finally arrive at their desired destination (Gerçek & Özveren, 2025). Exploring the current job contexts, evaluating opportunities and threats, and making decisions that best suit an individual's knowledge, skills, abilities, and dreams has become a challenge for nearly every person who wishes to build a career. Career exploration involves behaviors directed at seeking information regarding potential job opportunities and career paths aligned with career interests (Stumpf et al., 1983). Following the exploration of career options and the process of making well-informed career decisions, individuals proceed to the next stage of their career development. Since a career is related to an individual's life standards and well-being (Bimrose & Mulvey, 2015), it is a critical process for people who are willing to participate in the workforce. Career decision-making requires a level of preparedness that encompasses functional beliefs (Kulcsár et al., 2020), which could be healthier through career exploration. Exploration is important for an effective career decision-making process since it results in finding appropriate career alternatives and gaining a realistic understanding of the job markets.

Career development and management have been explained through many conceptual frameworks, each having unique significance. The social–cognitive model of career self-management (Lent & Brown, 2013) is a conceptual model that is used to explain individual educational and career development processes. This model specifically addresses career actions involving seeking career alternatives, job searching, and career transitions. Moreover, this framework is used to explain how self-efficacy sources of individuals are linked to career exploration and career decision-making efforts (Lent et al., 2016). Self-efficacy is a significant concept for career exploration and decision-making since it refers to the belief in one's ability to effectively perform a task or overcome a situation (Bandura, 1977). Given that self-efficacy might be domain-specific, career researchers have concentrated on its significance from a career-oriented perspective. Self-efficacy is considered a vital personal resource for career exploration (Blustein, 1989), as it develops confidence in individuals to gain perspective and make optimal career decisions. Moreover, Lent et al. (2017) state that career exploration and career decision-making behaviors share a common self-efficacy mechanism based on an individual's capacity to

effectively direct their own career development. Lent and Brown (2013) expanded the social–cognitive model to encompass career exploration and decision-making, creating a measurement tool that integrates these two concepts beneath an integrated structure. The primary objective of this initiative was to enhance the operational implementation of the social–cognitive model of career self-management. This integrated paradigm allows researchers to analyze both the content and the process of individual career development. Also, Lent et al. (2016) aimed to address the shortcomings of prior assessment instruments, as previous studies have shown that career decision self-efficacy has multivariate associations with several factors within the career self-management framework. Consequently, they attempted to improve the functionality of self-efficacy measures within the CSM model by integrating beliefs pertaining to career exploration and decision-making as interconnected domains of self-efficacy. Thus, developing a single integrated self-efficacy measure that contains career exploration and decision self-efficacy (CEDSE) with a more consistent factor structure and higher reliability enabled a stronger and more holistic test of the CSM model. CEDSE comprises searching for career alternatives and seeking more information about job positions. Thus, individuals with higher CEDSE could develop wider career aspirations and expand their career possibilities without decision anxiety. In contrast, low levels of CEDSE could result in decreased engagement in career exploration and decision-making behaviors (Luzzo, 1996). Studies show that exploration and decision-making self-efficacy are related to higher career decidedness and lower career indecision (Choi et al., 2012; Kleine et al., 2021).

The importance of CEDSE in career-related activities is associated with proactive career behaviors. Career proactivity defines people's ability to be anticipated and prepared to act in response to unforeseen and unpredictable changes in the career landscape. Consequently, considering the requirements of the current labor markets, proactive career behaviors are an essential characteristic for young individuals. Career engagement (CE), reflective of individuals' proactive career behaviors, is defined as "the degree to which somebody is proactively developing his or her career as expressed by diverse career behaviors" (Hirschi et al., 2014, p. 577). CE specifically emphasizes career management behaviors that encompass proactively influencing one's professional development, taking steps to attain career objectives, networking with relevant individuals, and engaging in educational and training efforts essential for career advancement. Furthermore, CE correlates positively with key variables that affect individual well-being in both career and life spheres, including career success (Hirschi & Jaensch, 2015), career satisfaction (Upadyaya & Salmela-Aro, 2015), and life satisfaction (Çarkıt, 2022). Therefore, the CE levels of university students, particularly during the school-to-work transition, represent a significant concern about their future life satisfaction that needs examination. The school-to-work transition is a pivotal stage in which career identity is formed and entry into the labor market takes place; however, it inevitably entails uncertainty and anxiety (Ryan, 2001), necessitating the development of essential psychological resources. CEDSE has the potential to improve individuals' CE during this challenging period. CE is influenced by several social–cognitive variables, since individuals are perceived as engaged and self-constructing agents during the career development process (Hirschi & Freund, 2014). Previous studies, especially with university

students, have identified key variables influencing CE, such as personality (Nilforooshan & Salimi, 2016), psychological capital (Baluku et al., 2021), social capital (Sou et al., 2022), and self-efficacy (Rogers et al., 2008). Given that higher levels of CEDSE are likely to contribute positively to individuals' proactive behaviors, it was hypothesized that:

H1 *CEDSE is positively related to CE.*

The sequential mediating role of career adaptability and career calling

Studies examining the antecedents of proactive career behaviors point out two particularly important variables, namely career adaptability (CA) and career calling (CC). Grounded in Savickas's (2005) career construction theory (CCT), CA is defined as the ability to cope with changes in the world of work (Rottinghaus et al., 2005). In the context of shifting and evolving work practices, organizational structures, and recruitment processes, individuals who are about to enter the labor market depend on their levels of CA to take the right steps for themselves (Savickas & Porfeli, 2012). This fact is because individuals with higher levels of CA are better able to anticipate changes in the environment and adapt to them. Within this context, there is a connection between self-efficacy and CA, as individuals who believe in their ability to succeed in a given domain are also more likely to demonstrate a stronger tendency to cope with change. Previous studies have demonstrated a positive relationship between self-efficacy and CA across general (Marcionetti & Rossier, 2021) and career domains (Hou et al., 2019; Li et al., 2023; Stead et al., 2022). Furthermore, the social–cognitive model of CSM takes self-efficacy as an important variable for career outcomes (Lent & Brown, 2013; Lent et al., 2016). Moreover, a time-lagged study by Volmer et al. (2023) shows a reciprocal relationship between career adaptability and occupational self-efficacy, indicating that these two variables influence each other across time. Therefore, CEDSE, which signifies individuals' confidence in their capacity to assess their career domain, create alternatives, and identify a career path that aligns with their knowledge, skills, and competencies, demonstrates significant personal resource potential for adaptive capacity, empowering individuals to overcome career-related uncertainties and obstacles they might encounter. Thus, it was hypothesized that:

H2 *CEDSE is positively related to CA.*

The concept of calling, described as an inner sense of profound purpose, has received a lot of consideration in the career and work domain. Early research characterizes calling as a perception of purpose or higher meaning (Dik & Duffy, 2009) and establishes a link between calling and identity (Dreher et al., 2007). Elangovan et al. (2010) assert that calling emphasizes action over mere existence and encompasses a pro-social intention. Moreover, Elangovan et al. (2010) underline that the essence of calling lies in the alignment of the actual, ideal, and

ought selves. From this viewpoint, calling could be regarded as a consequence of a discrepancy arising from adaptation and the pursuit of meaning. In this context, self-efficacy indicates to an individual that they possess capability and that their actions are congruent with their identity. While calling is regarded as a precursor to self-efficacy, the study by Hirschi and Herrmann (2013) demonstrated that a perception of calling and self-efficacy develop concurrently. Kaminsky and Behrend's (2015) study, grounded in social–cognitive career theory (SSCT; Lent et al., 1994), discusses the complex connection between self-efficacy and CC, revealing correlations between the two variables. Moreover, Reed II et al. (2022) use a cognitive approach to explain calling, indicating that it could be a meaning of identity built cognitively. They argue that the aggregation of self-beliefs and the examination of one's identity could affect the perception of a calling. Ran et al. (2023) showed that career exploration and self-reflection positively affect CC. In a study with Turkish university students, Eryılmaz and Kara (2025) provided evidence in their time-lagged study that aligns with the present model, showing that early self-perceptions predict subsequent behavioral adaptation and engagement, which in turn facilitate the emergence of a sense of calling. From this perspective, self-efficacy could shape perceptions of events, giving individuals the confidence to do something and contribute to schema building, which could lead to the construction of calling. Therefore, it was hypothesized that:

H3 *CEDSE is positively related to CC.*

Over the years, empirical findings have supported that CA and CC are positively related among university students (Chen & Zhang, 2023; Ran et al., 2023). Although prior studies have predominantly framed CC as an antecedent to CA (Douglass & Duffy, 2015; Rudolph et al., 2017), there is increasing evidence showing the complexities of CC and indicating that the psychological mechanisms and mediating processes by which CC affects occupational outcomes remain limited. In this context, Guo et al. (2014), drawing on CCT, adopted an alternative viewpoint and showed that CA predicted university students' professional competencies through CC. Moreover, Yang and Chen (2020) examined the negative aspects of CC, demonstrating that it does not solely produce positive outcomes; under some circumstances; it might also result in demanding and potentially adverse effects for individuals. According to CCT, which considers career development as a dynamic and context-dependent process, it is reasonable to assert that CA acts as a fundamental psychological resource that empowers individuals, especially those in early career stages with uncertainty (Saks, 2018), to create a sustainable sense of CC. Individuals develop their careers by changing behaviors rather than relying solely on predetermined information. Additionally, during the transition from higher education to work, particularly in developing nations where career counseling activities are inadequate, young adults might lack a comprehensive grasp of career guidance. Consequently, after encountering and overcoming challenges, CC might be formed, as Hirschi and Freund (2014) noted that individuals function as self-constructing agents in the processes of

career development and management. At early career stages, individuals with a higher degree of CA might be more skilled at exploring career options and integrating their experiences into a vocational identity, potentially developing a sustainable sense of CC. Therefore, it was hypothesized that:

H4 CA is positively related to CC.

H5 The relationship between CEDSE and CC is mediated by CA.

Studies link CC to various forms of engagement, including study (Chen et al., 2016), learning (Chen & Zhang, 2023), and work (Xie et al., 2016) domains, suggesting that a higher sense of purpose leads individuals to be focused and dedicated in both educational and organizational settings. Moreover, CC was found to be positively related to career proactivity. Since calling increases individuals' tendencies to self-exploration and CE (Hirschi, 2011), CC triggers to execute career actions (Jiang et al., 2023). Proactive career management is particularly critical for young adults at their school-to-work stage, in which they transfer to the workforce and are faced with the realities of organizational life (Hirschi et al., 2014). CE focuses on the level of individuals' active participation in career behaviors, which is closely related to vocational identity, career skills, and attitudes. Therefore, being a vital part of the career development and management process, CE is a significant determinant of perceived employability and career satisfaction (Baluku et al., 2021), career success (Hirschi & Jaensch, 2015), and life satisfaction (Çarkıt, 2022), indicating that both vocational and broader life domains are affected by career proactivity. Moreover, studies have provided evidence that CA predicts CE (Nilforooshan & Salimi, 2016; Sou et al., 2022), indicating that the ability to overcome career challenges and adapt to changes within work environments has the potential to actively participate in career actions. From this perspective, CC could play an intermediary mechanism between CA and CE with the capability to serve as a key concept for constructing meaning and identity alignment. Thus, it was hypothesized that:

H6 CC is positively related to CE.

H7 The relationship between CA and CE is mediated by CC.

Drawing on the social–cognitive theory of CSM, individuals with higher CEDSE self-efficacy are expected to be more confident in discovering and identifying career opportunities as well as choosing between career alternatives, which could increase the possibility of actively participating in career actions. In this process, CA is a powerful personal tool that facilitates individuals successfully coping with the dynamism of the modern career world by equipping them with planning, controlling, and problem-solving skills (Hirschi et al., 2015). However, since career development is an evolving process, as CCT posits, CA functions as an adaptive resource that has the potential to lead to constructing meaning. From a sense-making perspective, during career transitions, individuals encounter adverse situations, and they find signals

and hints from their environment and create meaning from them (Vough & Caza, 2017). Thus, CA provides the ability to identify and use the hints, while CC could emerge after being engaged in this process. Ultimately, this sequential link could produce continuous efforts, active participation, and long-term personal investment, which result in CE. Therefore, based on both conceptual and empirical reasoning, the following hypothesis was proposed:

H8 The relationship between CEDSE and CE is sequentially mediated by CA and CC.

Methods

Analytical procedure

In this study, SPSS was used for the preliminary analysis of the data, while SPSS AMOS was employed for testing the hypotheses. In the descriptive analyses, means, standard deviations, correlations, skewness, and kurtosis values were calculated. In addition, AMOS was used to conduct validity and reliability analyses, and average variance extracted (AVE) and composite reliability (CR) values were reported. To assess the adequacy of various measurement and structural models, a number of statistical fit indicators are employed, including the χ^2 statistic, normed chi-square (χ^2/df), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and comparative fit index (CFI). The threshold requirements for these indices were $\chi^2/df < 2$, CFI > 0.90, SRMR < 0.08, and RMSEA < 0.08, following the guidelines established by Hu and Bentler (1999). To evaluate construct validity, the AVE for each construct was analyzed, with an AVE value of 0.50 signifying adequate convergence (Fornell & Larcker, 1981). On the basis of the study by Bagozzi and Edwards (1998), different measurement models were also examined for confirmatory factor analysis (CFA), and their fit indices were compared in order to assess the uniqueness of the research variables.

Participants

The study sample included 211 management students from two public universities in the Marmara region of Turkey. The university period of study aligns with emerging adulthood, a pivotal life phase during which important career decisions that profoundly affect future career development and life satisfaction are made (Arnett, 2007; Hlaďo et al., 2022). In a developing country such as Turkey, where the youth unemployment rate exceeds 15% (TÜİK, 2025), university students are particularly vulnerable to early career-related stress, indecision, and difficulty adjusting (Demirtaş & Kara, 2022). Consequently, students' self-efficacy in their chosen domain and its association with adaptability and proactive career activities are critical factors concerning their chances of unemployment. The Marmara region was considered an ideal sampling location since it accommodates approximately 20% of

Turkey's population, possesses a highly competitive labor market, and reflects different socioeconomic profiles. Data were gathered from students at a public university in Istanbul and another in Kocaeli, both notable for their dense concentration of business centers and industrial areas. The sample comprised first-year students, who are at a pivotal transition phase where career-related beliefs and adaptation processes are particularly significant. Data were collected through an online questionnaire, including measurement scales for the study variables and demographic questions. At the beginning of the questionnaire, participants were informed of the study and it was stated that participation was voluntary.

Data collection occurred at two points (T1 and T2). The initial phase of data gathering occurred in March 2025, followed by the subsequent phase in June 2025. A total of 294 questionnaires were gathered online through Google Forms at T1, and 291 questionnaires were obtained at T2. Responses from the two sessions were matched using participant-assigned identifying codes, and participants who did not reply at both time points were omitted from the analysis. Thus, the final sample included 211 valid questionnaires. Among the participants, 70.6% (n = 149) were female, whereas 29.4% (n = 62) were male. In terms of age distribution, 29.4% (n = 62) were aged 18–20 years, 61.6% (n = 129) were aged 20–21 years, and 9.5% (n = 20) were 22 years or older.

Measures

Career exploration and decision self-efficacy (CEDSE)

In accordance with Lent et al. (2016, 2017), career exploration and decision self-efficacy were measured via an integrated CEDSE construct to yield a more comprehensive and psychometrically valid measure of career-related self-efficacy. CEDSE was measured by the scale developed by Lent et al. (2016). The CEDSE scale consists of 12 items scored on a five-point Likert scale (from 0 = no confidence at all to 4 = complete confidence). A sample item is "manage negative feelings if your first choice does not work out and you need to find another career choice". Prior research showed an internal consistency value of 0.70 (Çarkıt, 2024).

Career adaptability (CA)

CA was measured with the CA dimension of the Career Future Inventory (CFI) developed by Rottinghaus et al. (2005). This sub-dimension includes 11 items on a five-point Likert scale (from 1 = strongly disagree to 5 = strongly agree). An example item is "I can overcome potential barriers that might exist in my career." The original study demonstrated a Cronbach's α coefficient of 0.85.

Career calling (CC)

The Brief Calling Scale (BCS) developed by Dik et al. (2012) was used to assess CC. BCS is a four-item unidimensional measurement tool scored on a five-point

Likert scale (from 1 = not at all true of me to 5 = totally true of me). A sample item is "I have a calling to a particular kind of work." The consistency value of the scale was 0.88 in previous studies (Bott & Duffy, 2015).

Career engagement (CE)

CE was measured with the Career Engagement Scale (CES) developed by Hirschi et al. (2014). The scale consists of nine items on a five-point -Likert scale (from 1 = almost never to 5 = very often). A sample item is "undertook things to achieve your career goals". The internal consistency value in the original study was 0.89.

Findings

Descriptive results

Descriptive statistics, reliability, validity, and correlations among the study variables are reported in Table 1. The mean scores ranged from 3.30 to 4.05, indicating moderate to moderately high levels of the variables among the participants. CC showed the highest mean score (M = 4.05, SD = 0.67), whereas CE showed the lowest mean (M = 3.30, SD = 0.87). The correlation analysis indicated a positive and significant relationship between CEDSE and CA (r = 0.375, $p < 0.01$), CC (r = 0.543, $p < 0.01$), and CE (r = 0.294, $p < 0.01$). CA showed a positive correlation with CC (r = 0.389, $p < 0.01$) and CE (r = 0.216, $p < 0.01$). Furthermore, CC had a significant correlation with CE (r = 0.324, $p < 0.05$). The correlation pattern confirms the anticipated positive relationships among the studied variables. Cronbach's α and composite reliability (CR) values exceeded the required level of 0.70 for all constructs, demonstrating adequate internal consistency. CR values ranged between 0.83 and 0.90. Convergent validity was evaluated by using the average variance extracted (AVE). AVE results ranged from 0.44 to 0.55, although the AVE value for CC fell slightly below the recommended criterion of 0.50. However, Malhotra and Dash (2011) propose that CR could be considered in such conditions. The skewness

Table 1 Descriptive statistics, reliability, validity, and correlations of the study variables

Variable	Mean	SD	1	2	3	α	CR	AVE	Skewness	Kurtosis
(1) CEDSE	3.59	0.366				0.87	0.90	0.54	−0.215	0.353
(2) CA	3.68	0.725	0.375**			0.84	0.87	0.50	−0.460	0.568
(3) CC	4.05	0.673	0.543**	0.389**		0.82	0.84	0.44	−0.576	0.665
(4) CE	3.30	0.869	0.294**	0.216**	0.324*	0.91	0.83	0.55	−0.367	0.142

N= 211

CEDSE career exploration and decision self-efficacy, *CA* career adaptability, *CC* career calling, *CE* career engagement, α Cronbach's alpha, *CR* composite reliability, *AVE* average variance extracted

**$p < 0.01$

Source: the authors

and kurtosis values for all variables were within acceptable limits, suggesting that the data were appropriate for subsequent parametric analyses.

Measurement model

Confirmatory factor analysis (CFA) was performed with AMOS, and multiple measurement models were evaluated according to recommendations provided by Bagozzi and Edwards (1998). Table 2 presents the findings of six different models used to assess the distinctiveness of the research constructs. The suggested four-factor model, comprising CEDSE, CA, CC, and CE as distinct latent variables, exhibited an acceptable model fit ($\chi^2 = 508.800$, df = 314, χ^2/df = 1.620, $p = 0.000$, RMSEA = 0.054, SRMR = 0.063, CFI = 0.932). All fit indices met widely recognized thresholds, indicating that the four constructs are empirically distinguishable. The remaining three-factor models had significantly worse fit. The model combining CEDSE and CA while maintaining CC and CE as distinct components yielded worse fit indices ($\chi^2 = 1085.801$, df = 321, χ^2/df = 3.383, RMSEA = 0.107, SRMR = 0.095, CFI = 0.733). The model combining CEDSE and CC, while considering CA and CE as separate components, also demonstrated poor fit ($\chi^2 = 905.560$, df = 321, χ^2/df = 2.281, RMSEA = 0.093, SRMR = 0.078, CFI = 0.796). The two-factor models exhibited an additional decrease in model fit. The model, which includes CEDSE and CA as a single factor, with CC and CE as another, yielded poor fit indices ($\chi^2 = 1397.858$, df = 323, χ^2/df = 4.328, RMSEA = 0.126, SRMR = 0.141, CFI = 0.625). A similar result was noted for the alternative two-factor model combining CEDSE and CC, as well as CA and CE ($\chi^2 = 1370.653$, df = 323, χ^2/df = 4.244, RMSEA = 0.124, SRMR = 0.145, CFI = 0.635). Furthermore, the one-factor model, in which all items loaded onto a single latent factor, exhibited the worst fit to the data ($\chi^2 = 1928.667$, df = 324, χ^2/df = 5.953, RMSEA = 0.154, SRMR = 0.149, CFI = 0.441). The results of the CFA indicate that the four-factor measurement model shows a

Table 2 CFA results for alternative measurement models

Model	χ^2	df	χ^2/df	p	RMSEA	SRMR	CFI
(1) Four-factor model	508.800	314	1.620	0.000	0.054	0.063	0.932
(2) Three-factor model (CEDSE and CA–CC–CE)	1085.801	321	3.383	0.000	0.107	0.095	0.733
(3) Three-factor model (CEDSE and CC–CA–CE)	905.560	321	2.281	0.000	0.093	0.078	0.796
(4) Two-factor model (CEDSE and CA–CC and CE)	1397.858	323	4.328	0.000	0.126	0.141	0.625
(5) Two-factor model (CEDSE and CC–CA and CE)	1370.653	323	4.244	0.000	0.124	0.145	0.635
(6) One-factor model	1928.667	324	5.953	0.000	0.154	0.149	0.441

$N = 211$

RMSEA root mean square error of approximation, *SRMR* standardized root mean square residual, *CFI* comparative fit index

Source: the authors

much superior fit to the data compared to other models, thus providing evidence for the discriminant validity of CEDSE, CA, CC, and CE as separate variables.

Structural model

Table 3 presents the results of SEM that examines the direct, indirect, and total effects of CEDSE, CA, CC, and CE. The overall fit indices demonstrate that the proposed structural model aligns well with the data (χ^2 = 508.800, df = 314, χ^2/df = 1.620, CFI = 0.932, SRMR = 0.063, RMSEA = 0.054, p = 0.000), hence confirming the accuracy of the hypothesized model. According to the findings, CEDSE showed a positive and statistically significant effect on CA (direct effect (DE) = 0.417, 95% confidence interval (CI) [0.266; 0.564], $p < 0.01$), indicating that higher levels of CEDSE correlate with increased CA. Additionally, CEDSE showed a significant positive effect on CC (DE = 0.538, 95% CI [0.395; 0.669], $p < 0.01$), suggesting that students who have greater self-efficacy in career exploration and decision-making are more inclined to perceive a sense of calling in their career endeavors. The direct effect of CEDSE on CE was not significant (DE = 0.164, 95% CI [−0.045; 0.380]), indicating that self-efficacy alone requires intervening psychological resources to directly result in active career engagement. CA appeared as a significant predictor of CC (DE = 0.220, 95% CI [0.070; 0.374], $p < 0.01$), emphasizing the importance of adaptability in developing a sense of calling. Moreover, CC positively affected CE (DE = 0.282, 95% CI [0.034; 0.513], $p < 0.05$), indicating that viewing one's career as meaningful and purposeful increases involvement in career-related activities. The mediation analyses provide a deeper understanding of these connections. CEDSE showed a significant indirect effect on CC through CA (indirect effect (IE) = 0.092, 95% CI

Table 3 SEM results

Path	DE	95% CI	IE	95% CI	TE	95% CI
CEDSE → CA	0.417**	[0.266; 0.564]			0.417**	[0.266; 0.564]
CEDSE → CC	0.538**	[0.395; 0.669]			0.630**	[0.513; 0.732]
CEDSE → CE	0.164	[−0.045; 380]			0.341**	[0.202; 0.470]
CA → CC	0.220**	[0.070; 0.374]			0.220**	[0.070; 0.374]
CC → CE	0.282*	[0.034; 0.513]			0.282*	[0.034; 0.513]
CEDSE → CA → CC			0.092**	[0.031; 0.167]		
CA → CC → CE			0.062*	[0.004; 0.146]		
CEDSE → CA → CC → CE			0.053*	[0.003; 0.137]		

N= 211

CEDSE career exploration and decision self-efficacy, *CA* career adaptability, *CC* career calling, *CE* career engagement, *DE* direct effect, *IE* indirect effect, *TE* total effect, *CI* confidence interval

*p <0.05, **p< 0.01, χ^2 = 508.800, df= 314, χ^2/df= 1.620, CFI = 0.932, SRMR = 0.063, RMSEA = 0.054, p = 0.000

Source: the authors

[0.031; 0.167], $p < 0.01$), indicating that self-efficacy's effect on CC functions through increased adaptability. Furthermore, CA had a significant indirect influence on CE via CC (IE = 0.062, 95% CI [0.004; 0.146], $p < 0.05$), indicating that adaptive individuals show greater CE due to their development of a greater sense of calling. Moreover, the sequential indirect effect of CEDSE on CE via CA and CC was significant (IE = 0.053, 95% CI [0.003; 0.137], $p < 0.05$). This finding demonstrates a sequential mechanism in which CEDSE increases CA, subsequently increasing CC, and ultimately resulting in increased CE. These findings emphasize the significance of adaptability and calling as essential psychological mechanisms connecting self-efficacy in career exploration and decision-making to proactive involvement in career development activities.

Testing an alternative ordering of the mediators

This study's core hypothesis posits that CEDSE influences CE via the sequential mediation of CA and CC. Additional analyses were conducted by testing an alternative ordering of the mediators, where CC followed CA, to evaluate a different sequence. For clarity, Table 4 reports the key structural paths associated with the alternative ordering. The findings indicated that CEDSE directly affected CC ($\beta = 0.630$, 95% CI [0.513, 0.732]), but did not affect CE ($\beta = 0.164$, 95% CI [−0.045, 0.380]). Furthermore, CC showed a significant direct effect on CA ($\beta = 0.302$, 95% CI [0.099, 0.512]); however, the direct path from CA to CE was non-significant ($\beta = 0.000$, 95% CI [−0.197, 0.196]). Similarly, the sequential indirect effect of CEDSE on CE via CC and CA was not significant ($\beta = 0.000$, 95% CI [−0.094, 0.084]), suggesting that the alternate ordering of the mediators was not supported. Consequently, these findings support the first hypothesis, as the alternative ordering of the mediators did not receive empirical support.

Figure 1 represents the research model with SEM results.

Table 4 Additional analysis results

Path	DE	95% CI	IE	95% CI	TE	95% CI
CEDSE → CC	0.630**	[0.513; 0.732]			0.630**	[0.513; 0.732]
CEDSE → CE	0.164	[−0.045; 0.380]			0.341**	[0.202; 0.470]
CC → CA	0.302**	[0.099; 0.512]			0.302**	[0.099; 0.512]
CA → CE	0.000	[−0.197; 0.196]			0.000	[−0.197; 0.196]
CEDSE → CC → CA → CE			0.000	[−0.094; 0.084]		

N= 211

CEDSE career exploration and decision self-efficacy, *CA* career adaptability, *CC* career calling, *CE* career engagement, *DE* direct effect, *IE* indirect effect, *TE* total effect, *CI* confidence interval

*p <0.05, **p< 0.01, $\chi^2 = 508.800$, df= 314, χ^2/df= 1.620, CFI = 0.932, SRMR = 0.063, RMSEA = 0.054, $p = 0.000$

Source: the authors

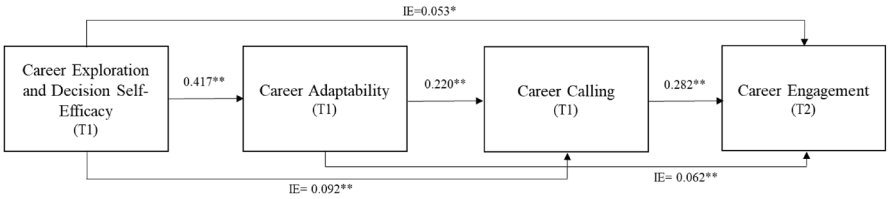


Fig. 1 Research model with SEM results

Discussion

The present research examined the relationships among CEDSE, CA, CC, and CE using a time-lagged SEM approach, focusing on university students undergoing the school-to-work transition. The findings supported the suggested sequential model, indicating that CEDSE influences CE through the sequential mediation of CA and CC, based on the social–cognitive perspective on career self-management and CCT. CEDSE showed a significant and positive effect on CA and CC, suggesting that students who are confident in career exploration and decisions are better equipped to confront occupational tasks and uncertainties and are more likely to develop a sense of CC. This finding aligns with Lent's CSM model, which asserts that self-efficacy is a fundamental personal resource that facilitates adaptive career behaviors and goal-oriented activities (Lent et al., 2016). However, the direct effect of CEDSE on CE was not statistically significant. The findings suggest that confidence in career exploration and decision-making does not directly result in active participation in career activities. Thus, the impact of CEDSE on CE appears to function through mediating mechanisms. This finding emphasizes the significance of evaluating motivational and adaptive mechanisms in understanding the influence of self-efficacy on CE. Although there are studies indicating that self-efficacy affects CE (Rogers et al., 2008), there is a lack of research examining which variables might take part in this relationship, particularly within a model that simultaneously incorporates adaptability and calling. Moreover, the findings of the present study are consistent with prior research suggesting reciprocal relationships between self-efficacy and calling (Hirschi & Herrmann, 2013). Self-efficacy has the potential to influence the development of calling, and in line with this perspective, the present study found that CEDSE had a significant effect on CC. Moreover, it was determined that CA is a significant predictor of CC. Contrary to the prevalent literature on calling, which posits that CC precedes CA, the findings of this study indicate that, during the school-to-work transition among university students in a developing country lacking comprehensive career guidance, CC might develop following adaptive processes. This finding corresponds with Guo et al.'s (2014) study including university students, indicating that CA could predict CC. Moreover, CC demonstrated a positive effect on CE, indicating that a sense of purpose could increase proactive career efforts. In addition, although the effect of CA on CE has been well established in prior research (Sou et al., 2022), the present study extends this line of research

by demonstrating that CC operates as an intervening mechanism in this relationship and, in turn, significantly influences CE. The mediation analyses supported the proposed sequential mediation approach. The significant indirect influence of CEDSE on CC through CA suggests that adaptability clarifies the role of self-efficacy in improving CC's development. The indirect effect of CA on CE through CC indicates that adaptability influences participation in career activities via CC. These findings indicate that, among university students who are in a stressful developmental period and might experience challenges related to self-efficacy, CEDSE influences engagement in active career behaviors indirectly. Particularly, students' involvement in behaviors such as analyzing labor markets, participating in job search interviews, and generating alternative career options is facilitated by both their ability to manage challenges encountered in dynamic work environments and their capacity to construct meaning and develop a sense of purpose in their career journeys.

The core hypothesis of this study was that CEDSE affects CE through the sequential mediation of CA and CC. In other words, this study examined whether participants' beliefs in their career exploration and decision-making capabilities would strengthen their ability to adapt to career challenges and whether the meaning emerging from this adaptation would result in a sense of purpose that translates into proactive career behaviors. From this perspective, the fundamental argument was that adaptability creates meaning, which in turn encourages career actions. This assumption was based on the understanding that, especially in countries with continuous unemployment, the meaning of construction related to a career might be influenced by the need to adapt to high levels of labor market volatility. Despite this theoretical justification, previous empirical findings are not entirely consistent regarding the sequence of CC and CA. Prior studies indicate that CC precedes CA among different study samples with different career stages and different cultures (Douglass & Duffy, 2015; Dumulescu et al., 2015; Ran et al., 2023). However, there is evidence pointing out potential adverse effects of calling and suggesting that CC might potentially arise from adaptation processes (Yang & Chen, 2020). For instance, Guo et al. (2014) demonstrated that CA could predict CC among Chinese students. This study suggests that the link between CC and CA might be determined by economic and cultural circumstances, academic disciplines, as well as career stages. This highlights the necessity of analyzing career development processes within their distinct socioeconomic contexts instead of presuming a universal causal sequence. Thus, the study also examined whether CC could precede CA in the effect of CEDSE on CE. In the alternative model, the sequential mediation between CEDSE and CE via CC and CA was not significant. The results from the alternative model demonstrated that CC directly affected CA; however, the effect did not extend to CE. Therefore, the relationship between CEDSE and CE failed to function when CC initiated sequential mediation. In other words, consistent with this study's core assumption, CA appeared to contribute to CE when embedded within a broader meaning-making process, as reflected by CC. These findings support the suggested sequence of CA before CC in the relationship between CEDSE and CE for young adults in the school-to-work transition period.

Theoretical implications

This study adopts the social–cognitive model of the CSM perspective (Lent & Brown, 2013), which emphasizes the career process rather than career content, and demonstrates how self-efficacy influences CE, conceptualized as a determinant of proactive career behaviors. The social–cognitive model of CSM clarifies how individuals make educational and occupational decisions and navigate developmental tasks, including career challenges and crises (Brown & Lent, 2019). Therefore, demonstrating how CEDSE influences CE through CA and CC represents an important contribution to career literature within this model's framework. The CSM model conceptualizes self-efficacy as an essential personal resource that impacts career actions and asserts that adaptive behavior is fundamental to this relationship. The findings of the current study indicate that CEDSE positively predicts CA, with CA serving as a sequential mediator between self-efficacy and career actions.

CCT (Savickas, 2012) emphasizes adaptability as one of the most critical individual career resources in today's dynamic labor markets. The two key concepts that highlight the necessity for people to continue to be both anticipatory and equipped to respond to unforeseen events are agency in Savickas's CCT and preparation in Lent's model (McIlveen & Midgley, 2015). Young adults in today's work environments are increasingly inclined to "expect the unexpected". In this context, CA becomes a significant notion in both theoretical frameworks. This study proposed and demonstrated how CA influences CC, particularly among university students who are undergoing the school-to-work transition, which is an important and specific career phase. This discovery corresponds with the dynamic and process-oriented characteristics of both theories and with CCT's representation of the self as an agent, emphasizing individuals' proactive involvement in constructing their careers. From this viewpoint, adaptive processes improve sense-making, leading to the emergence of a calling from collected career experiences. The findings of this study show a correlation between CA and CC, consistent with prior literature, while also suggesting that the nature of this relationship could vary across particular career contexts. Therefore, future studies could gain insights by investigating the particular settings under which CA promotes the development of calling across various career stages and demographic groups.

Although previous research has frequently reported a direct relationship between CA and CE, the current findings suggest that this relationship may be conditional and context dependent. This finding suggests that proactive career behaviors could emerge as a result of calling influenced by adaptability beliefs. In this respect, CC appears to function as a critical interpretive bridge through which adaptability resources are activated. Moreover, this finding suggests that CC could be a bidirectional variable. CC could develop as a result of CA or serve as a trigger for adaptability across different career contexts. In the present study, CC was recognized as a consequence of adaptive mechanisms that contribute to CE. This discovery suggests that CA might require a motivational and explanatory framework to be successfully reflected in proactive career behaviors, especially in competitive and uncertain labor market conditions during the early stages of a person's career.

Practical implications

The current study's identification of the roles of adaptability and sense of purpose in the link between self-efficacy and career actions provides valuable practical insights for higher education institutions, career counselors, and university students. In an environment of rapidly accelerating change, especially with the exponential growth of artificial intelligence applications throughout all sectors of the labor market, it is advisable for higher education institutions to provide training modules that emphasize both self-efficacy and adaptability. These modules could be strengthened by increasing internships, university–industry collaborations, and public–private partnership initiatives that facilitate the school-to-work transition, thus allowing students to establish connections with professionals actively involved in current work environments. Also, strengthening the practical elements of the curriculum and offering students opportunities for experiential application could further improve their work readiness. An additional significant implication involves the role of career support services offered by universities as well as by governmental and nongovernmental organizations. These services could provide training and counseling to young adults regarding self-efficacy, adaptability, calling, and career actions. Career counselors might find it advantageous to perceive calling as a potential result of adaptive behaviors rather than a static orientation, viewing career development as a dynamic process and advising young individuals accordingly.

The finding that CC emerged as a result of CA in the present study suggests that, for young adults in the Marmara region, which is Turkey's largest industrial hub where unemployment is perceived as a chronic problem, CC might represent a meaning-making process that develops through adapting to career-related dynamics. Although the sequential mediation effect in this study was relatively small, such effect sizes are to be expected during the school-to-work transition phase since it is a crucial career development stage. Furthermore, the relatively small effect size observed in this study may be explained by the fact that CE is influenced by a wide range of individual, contextual, and structural factors. While the effect size is small, future research employing three-wave longitudinal designs may provide further insight into how these effects evolve. Moreover, the relatively small effect size might be related to the influence of numerous factors and to the sensitivity of the findings to sample characteristics, which allows for the development of several practical recommendations. Career-guiding practices could be strengthened by interventions that connect self-efficacy beliefs to CA and CC, rather than concentrating exclusively on career self-efficacy. In this context, integrative approaches to development could be provided to students in career guidance settings. The design of career development programs that include several complementary elements is recommended. For instance, guided mental imagery and introspective exercises could help students in seeing their future careers and examining how responding to evolving professional demands might enhance their sense of purpose (Marshall & Farrell, 2019; Stoltz et al., 2018). Furthermore, scenario-based interventions that reveal potential career obstacles and alternative career trajectories might promote the transformation of CEDSE into proactive career actions (Dunn & Fallah, 2024; Linnér et al., 2021). Such practices might help students in modeling adaptive answers, increasing

confidence in handling uncertainty, and aligning personal beliefs with career-oriented actions.

Limitations

The current study is constrained by several limitations. The findings are confined to data derived from a particular sample and should be evaluated within the cultural and geographical context of data collection. The present study is subject to several limitations regarding sample selection. Although collecting data from university students studying in a highly competitive labor market and a dense concentration of business centers in Turkey's Marmara region provides the potential for reflecting socioeconomic diversity, this approach to sampling may also introduce outcome bias. Students enrolled in management-related programs are likely to have higher levels of career awareness and orientation due to their participation in management and career-focused courses, in contrast to students from other academic disciplines not included in the sample. Thus, the generalizability of the findings to the broader group of young adults is limited. To overcome this limitation, future research is recommended to replicate the proposed model using data collected from students enrolled in engineering and other social science disciplines, as well as from institutions located in different geographic regions. Also, following studies might investigate academic major as a possible moderator. Additionally, selecting samples that reflect diverse cultural contexts would facilitate cross-cultural replication and comparative analysis. Moreover, all data were obtained by self-report measures, which might be prone to biases such as social desirability and common method variance, along with respondents' subjective perceptions. Future research could enhance the validity of the findings by integrating diverse data sources, such as behavioral metrics, assessments from academics or counselors, and qualitative approaches. The sample was restricted to first-year students. This group is particularly important for analyzing early career attitudes and adaptation processes; nevertheless, the observed associations might change at later career phases as individuals gain more job experience. Future investigations might replicate the model with students from various academic years or with young professionals to investigate whether the sequence of CA and CA differs across career phases. The two-wave time-lagged design, which incorporates temporal separation between the study variables, reduces common method bias; yet it is limited to enable causal inferences. Future research might use multi-wave longitudinal designs to more thoroughly investigate the temporal relationships among CEDSE, CA, CC, and CE. Such designs would provide a more accurate analysis of the interactions among these constructs throughout time and would enhance the comprehension of possible causal mechanisms. In addition, while the CR values for all constructs fell within acceptable ranges, demonstrating adequate internal consistency, the AVE for CC was below the generally accepted level of 0.50. In this study, we adopted Malhotra and Dash's (2011) approach that suggests that, if there is acceptable composite reliability for a variable, then it could compensate for a marginally low AVE. Nonetheless, this finding still indicates a

possible constraint regarding the convergent validity of the CC construct. Testing the measurement model with additional diverse samples might clarify whether the low AVE for CC is specific to the sample. The sample was limited to university students at a specific career stage. Analyzing these relationships among individuals at various career stages, such as early-career professionals, mid-career employees, or those experiencing career transitions, would yield a more thorough comprehension of how self-efficacy, adaptability, and calling develop and interact across different career contexts. Moreover, the relationship between CEDSE and CE could be explained with different mediatory mechanisms such as future work-self, self-perceived employability, or vocational identity.

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Data availability Data could be shared upon any reasonable request.

Declarations

Conflict of interest The authors declare that there is no conflict of interest.

Ethical approval The study has obtained ethical approval from the Istanbul University Social and Human Sciences Research Ethical Committee with no. 2025/156-3272592 and adheres to institutional regulations regarding ethics and publishing.

Informed consent Consent was received from all participants.

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