RESEARCH



Relationship between metacognitive skills and career exploration outcome expectations: mediating role of parental and peer attachment styles



Serkan Volkan Sari^{1*}, Fatih Camadan² and Sefa Özmen³

Abstract

Background Early career development—the first stage of an individual's journey to get to know themselves and their profession—is very important in the career choice process. The correct identification of the variables that influence this process is valuable for the healthy continuation of the developmental process. This study examined whether maternal, paternal, and peer attachment styles play a mediating role in explaining career exploration outcome expectations of metacognitive skills.

Methods The hypotheses created for this purpose were examined within the framework of the correlational/ relational design of quantitative research models. The target population comprised students studying in secondary schools in Turkey in 2023, and the sample comprised 318 individuals—168 boys and 150 girls—selected using convenience sampling method. SPSS 25.0 Process Macro 4.1 version "Model 6," developed by Hayes, was used for multiple mediation analysis.

Results Metacognitive skills positively and significantly predicted career exploration outcome expectations and maternal and paternal attachment styles, but not peer attachment style. Maternal, paternal, and peer attachment styles did not significantly explain career exploration outcome expectations. Finally, maternal, paternal, and peer attachment styles did not significantly mediate the relationship between metacognitive skills and career exploration outcome expectations.

Conclusion These results show that individuals' metacognitive skills play an important role in the process of career exploration and goal setting. Moreover, individuals' metacognitive skills have a stronger association with family ties than with peer relationships. However, individuals' ties to their mothers, fathers, and peers are not a determining factor in the formation of individuals' expectations about their careers. Additionally, the relationship between metacognitive skills and career exploration outcome expectations occurs directly, independent of maternal, paternal, and peer attachment styles. Thus, individual characteristics, rather than social factors, such as family or peer relationships, play a significant role in shaping individuals' expectations about career exploration.

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Keywords Career exploration outcome expectations, Metacognitive skills, Attachment style

Introduction

In the 21st century, changing paradigms in the career field have shaped individuals' occupations and occupational preferences [1]. Eryilmaz and Mutlu [2] highlighted the relationship between career development and mental health. The career development process is related to the accuracy of career choices made, the extent to which individuals recognize their potential, and the extent to which they believe in what they can do. The factors that influence the ability to make the right and successful career choice are a topic that modern psychology is still investigating. In this context, career exploration, metacognitive skills, and attachment styles are the most effective factors in explaining an individual's career exploration process. In recent years, social-cognitive-based career exploration has investigated the factors affecting career choices [3-5]. The concept that draws attention to this point is career exploration outcome expectations. An individual's belief in the success they can ultimately achieve in a job can lead them to a successful career choice if they can discover their individual characteristics in the right way. The concept of career exploration outcome expectations includes career exploration behavior and outcome expectations, which are explained below.

Career exploration outcomes expectations

In their self-concept life-span career theory, Super et al. [6] stated that individuals who fail to achieve professional development tasks during adolescence experience difficulty choosing a profession in adulthood. Occupational tasks that come to the forefront in adolescence constitute the exploration stage of lifelong career theory [6, 7]. According to Lent et al. [8], experiences related to the career exploration process in these places particularly affect the individual's outcome expectations. Betz and Voyten [9] argued that outcome expectations are related to the consequences of an individual's behavior. According to the social cognitive mechanism, people develop prior beliefs based on their experiences and observations about the possible consequences of their behavior [10]. Outcome expectations in people who think that their behavior will yield the expected result allow the behavior to continue [11]. Fouad et al. [12] noted that career-related outcome expectations focus on the career decision-making process.

Duffy and Lent [13] emphasized that late adolescents and adults can make more realistic choices as they are aware of their interests and abilities; however, career decision-making outcome expectations in childhood may not be developmentally appropriate [14]. Nevertheless, children can dream about their future, observe key figures, obtain competent feedback, and experiment with activities at home, school, and in community contexts. This enables them to learn more about themselves, the working world, and multiple life roles and occupations. Career exploration is the main process in the development of children's career cognition and learning [15]. Children at an early age do not think about what they will do when they grow up, but what they want to be. In this context, the main purpose of career development at the primary school level is to increase the student's awareness of themselves and their career to support these thoughts [16].

Elkind [17] and Gibson [18] suggested that children in middle school have developed a more realistic view of the adult world-that is, a sense of independence and self-reliance. These children are expected to continue the career development goals that began in elementary school as a reflection of self-knowledge, educational and career exploration, and career planning [19]. Career exploration outcome expectations are defined as the perceived likelihood of achieving career progress outcomes by engaging in exploratory behavior [14]. Children explore their interests at school, at home, or in their social lives; gather information about occupations; and create their career objectives. They can consciously or unconsciously experience their careers and test the roles they can assume in terms of work-life [20]. Peskin et al. [21] found that male individuals were most likely to be viewed more favorably by adults, thus leading to a greater sense of confidence and poise. Female individuals who underwent less abrupt physical changes were viewed as more petite and feminine and enjoyed popularity and leadership privileges. According to Cheng et al. [22], these efforts contribute to the development of their outcome expectations.

According to Oliveira et al. [14], secondary school age children are in the hypothetical-deductive reasoning stage. A case study conducted by Niles et al. [16] included the vocational plans of a 10-year-old female student and her dreams of the veterinary and teaching professions. The student stated that if she chose these professions, she could spare time to discover professions; this type of thinking is called hypothetical-deductive thinking. The emergence of children's career exploratory outcome expectations is assumed to have roots in hypothetical-deductive reasoning. These skills allow children to imagine themselves in the business world and put in more effort in the process of career exploration [15]. By the age of 10 years, a child has passed the fantasy stage of career development and moved towards the interest stage, which involves enjoyable activities when career

choices are often associated with a desire for competence [5]. In this context, children must be encouraged to explore occupations that are compatible with their talents and skills [16]. This support can be provided by an individual's mother, father, and friends. It is important to understand which variables influence an individual's career exploration process, which is valuable to managing this phase in a realistic and qualified way. Research in the following section demonstrate that people use certain cognitive processes during the exploration process; therefore, metacognitive processes were incorporated into the research design to uncover their effects.

Metacognition skills

Metacognition, also referred to as "thinking about thinking," is defined as being aware of one's knowledge about one's cognitive processes and using this knowledge to manage cognitive processes [23]. In other words, metacognition is high-level thinking that involves active control over cognitive processes related to learning. Activities such as planning how to approach a particular learning task and monitoring and evaluating progress towards completion of a task are metacognitive in nature. Through studies, metacognition, which is related to attention [24], problem-solving [25], critical thinking [26, 27], self-regulation and self-control [28], listening and listening comprehension [29], academic achievement [30], and academic self-efficacy [31], has brought new perspectives to applied fields such as educational psychology and clinical psychology [23, 32–34].

Metacognitive skills are a substantial factor in success and have a positive and significant relationship with learning and academic achievement. This also points to the need for career and metacognitive research. Studies have shown that metacognition is a significant predictor of the career development process [2, 3, 19]. Although few studies have examined the relationship between career and metacognition in Turkey, Turan and Iskender [35]concluded that metacognitive awareness is a significant predictor of career and talent development self-efficacy.

Although many factors affect career exploration, research on this subject is limited, and no study has examined the relationship between career exploration outcome expectations and parental and peer attachment styles. Therefore, this study examined whether parental and peer attachment styles and metacognitive skills predict career exploration outcome expectations. If a relationship exists between metacognitive skills and career research outcome expectations, it is important to reveal how maternal, paternal, and peer attachment styles affect this relationship. It is critical to determine whether the attachment style that an individual develops toward the people in their close environment affects this situation, and to examine the effect of cognitive skills on career preferences.

Parental and peer attachment styles

Attachment styles are a useful concept in explaining the relationship between career exploration behavior and metacognitive skills. This concept, which is an important explanatory factor of behaviors in human life, undoubtedly plays a significant role in career exploration and the development of metacognitive skills. As social beings, humans need to be in relationships with other people throughout their lives. The first of these relationships is the "attachment" relationship between mother and infant based on basic trust [36, 37]. Bowlby [37] defined attachment as a "strong emotional bond" between the child and the mother or caregiver who responds to the child's needs. Children whose physical and emotional needs are met adequately and in a timely manner by their caregivers-especially in the first years of life-may develop secure attachment. By contrast, insecure attachment may occur in children whose needs are not adequately met and who are neglected with an indifferent and rejecting attitude. Additionally, securely attached infants see their caregivers as a safe base with a sense of security and comfort; consequently, they can safely explore the world around them [38-40].

Although attachment is primarily to parents, it can also be directed toward other caregivers, relatives, and friends, who have an important place in the individual's life. In this context, trust-based attachment relationships-the foundations of which are laid in the first years of life-affect children's emotional, social, and cognitive development throughout their lives [36, 37]. Based on this idea, some researchers have suggested that the quality of one's internalized relationship with one's parents is related to career development and career matching [41-43]. Studies have found positive and significant relationships between secure attachment to parents and individuals' exploration of the self and environmental opportunities [42, 43], commitment to career choice [41], career self-efficacy beliefs [44], career maturity [45], and career decision-making processes [46]. Although studies have examined the relationship between family dynamics and career development in Turkey [47-49], research on the relationship between attachment and career is limited. One study on this subject concluded that attachment to the mother is a strong predictor of career development [50]. The samples of the studies mentioned above primarily comprise high school and university students and adults; insufficient studies have been conducted on individuals of primary school age.

Theoretical framework regarding the mediating role

Career exploration outcome expectancy has been conceptualized as the expectations and beliefs individuals develop through career-related exploration and planning behaviors, which first emerge during the primary school period [15]. This concept is rooted in the "Social Cognitive Career Theory" proposed by Lent et al. [51], which emphasizes the role of career outcome expectancies shaped by exploratory experiences [20]. Career exploration outcome expectations refer to children's engagement in career exploration, their experiences in school, at home, and in social settings, and the inferences they draw from these experiences. This process involves the development of key skills, including identifying personal interests, researching occupations, setting career goals, and the beliefs children form about their competencies in these areas. Throughout these learning experiences, children employ metacognitive skills such as planning, monitoring, and evaluation, which facilitate the acquisition of new knowledge [52-54] Lent and Brown [55] emphasize that career self-management skills, as a form of metacognitive ability, play a crucial role in individuals' academic and career success. Integrating cognitive processes in career exploration aligns with Zimmerman's [56] Self-Regulated Learning Theory, which posits that students actively organize and regulate their thoughts during the learning process, ultimately transforming these cognitive strategies into skills that facilitate learning. One key factor influencing career exploration through cognitive and metacognitive learning processes is attachment style. Secure maternal attachment is a significant predictor of career exploration and decision-making skills [57]. Conversely, anxious attachment to parents is associated with higher levels of career indecision and deficits in career self-efficacy [35]. Additionally, secure attachment is a strong and positive predictor of career maturity [58] and career exploration behaviors [59–61]. The literature review revealed a lack of studies examining the mediating role of parental and peer attachment styles in the relationship between metacognitive skills and career exploration outcome expectancy. Although no direct empirical evidence has established a link between metacognitive skills-one of the key study variables-and career exploration or outcome expectations, previous research has highlighted an association between metacognitive skills and career development. Building on these findings, the present study investigates the mediating effect of attachment styles in the relationship between career exploration and metacognitive skills.

Study aim and hypotheses

This study aimed to examine whether maternal, paternal, and peer attachment styles have a mediating role in explaining the career exploration outcome expectations of metacognitive skills. Thus, the following hypotheses were tested:

H1 Metacognitive skills and career exploration outcome expectations are positively and significantly related.

H2 Metacognitive skills and maternal attachment style are positively and significantly related.

H3 Metacognitive skills and paternal attachment style are positively and significantly related.

H4 Metacognitive skills and peer attachment style are positively and significantly related.

H5 Maternal attachment style is positively and significantly related to career exploration outcome expectations.

H6 Paternalattachment style is positively and significantly related to career exploration outcome expectations.

H7 Peer attachment style is positively and significantly related to career exploration outcome expectations.

H8 Maternal attachment, paternal attachment, and peer attachment significantly mediate the relationship between metacognitive skills and career exploration outcome expectations.

Method

Study model

This study was conducted based on the correlational/ relational design of quantitative research models, which is based on determining whether at least two variables change together and the degree of any such change [62]. It attempted to determine whether a co-variation exists between secondary-school students' career exploration outcome expectations and their maternal, paternal, and peer attachment styles and metacognitive skills, and if so, the degree of this co-variation. Furthermore, if a significant relationship was found between metacognitive skills and career exploration outcome expectations, this study sought to reveal whether attachment with the mother, father, and peers significantly mediate this relationship. Owing to the cross-sectional research design, a cause-and-effect relationship between the study variables can not be established [63, 64]. Therefore, no inference should be made about how maternal, paternal, and peer attachment styles and metacognitive skills affect career exploration outcome expectations (causality) based on the results obtained from the study.

Study group

The middle-school period is an important educational step in the career development of students in Turkey. In Turkey, middle-school students gain the right to enroll in different high-school types according to the scores they receive from the High School Entrance Exam (HSEE), which was implemented by the Ministry of National Education in the 2017–2018 academic year and is taken at the end of four years of education. Students can be placed in different high school types, such as Science High Schools, Social Sciences High Schools, Project High Schools, and Vocational and Technical High Schools, according to the scores they receive from this exam [65]. The participation rate among middle-school students in the HSEE, which was implemented on June 2, 2024, was 95.61%, and 992,906 students took this exam [66]. The high school types that students are placed in after the exam serve as an infrastructure for the professions they choose. In this respect, the middle-school period has an important place in students' career planning, as they make critical decisions regarding their professions after the exam. The selection of the sample from secondary-school students was influenced by the fact that secondary school has a critical place in Turkey.

Convenience sampling, a nonrandom sampling method, was used to select the participants. This sampling method was chosen because it provides researchers with advantages in terms of time, money, and labor [67]. Although this sampling method allows the selection of individuals who want to participate in the research and can be easily reached, generalization of the results obtained from studies using this sampling method is risky [68]. One of the researchers is a teacher working in a secondary school; within the scope of this study, there was an opportunity to collect data from the students at the school where this teacher works. Therefore, the research participants were limited only to the students studying at the school where the teacher works. The secondary school in question is a state school located in the city center of a province in Turkey. The sample comprised 318 students at this school. The gender distribution of the participants was 168 (57.4%) male and 150 (42.6%)female students. The age range of the participants was 11-14 years (Mean_{age} =12.86, SD_{age} =0.71). The participants randomly selected from each grade of secondary school (1st grade = 69, 2nd grade = 66, 3rd grade = 90, 4th grade = 93). The sample size should not be less than 10 times the number of items in the measurement tool [69]. The Parent and Peer Attachment Inventory (PAPI) used in this study has the highest number of items, with 18 items. Accordingly, the sample size in this study should not be less than 180. As data were collected from 318 individuals in this study, the sample size was accepted to be sufficient. Additionally, it is recommended that a power

analysis be conducted to check the representativeness of the larger population of the study sample [70]. G*Power (Version 3.1.9.7) was used to calculate the required sample size in this study [71].Effect size (f^2): 0.15, power of the test (1- β): 0.80 and significance level (α): 0.05 were determined [72]. Consequently, it was calculated that the analysis should be conducted with at least 85 people. Based on these results, the sample size (n = 318) was considered sufficient.

Procedure

The study data were collected in the 2023–2024 academic year. Data collection occurred in five stages. In the first stage, permissions for use were obtained via e-mail from the researchers who developed the measurement tools. In the second stage, the necessary approval document was obtained from the Recep Tayyip Erdoğan University Social and Human Sciences Ethics Board regarding the ethical suitability of the study. In the third stage, written permission was obtained from the school administration, where one of the researchers worked as a teacher, on the application of the scales. In the fourth stage, permissions were obtained via e-mail from the parents of the students who were recruited to participate in the study. In the fifth stage, a total of 12 classes, three from each grade, were visited, and explanations were made to the students about the purpose of the study, how the instruments would be answered, and that their participation was voluntary. Furthermore, the participants were informed that their answers would only be used within the scope of this study and would be kept confidential, and no reward would be given. The researcher who was a teacher in the school directly administered the instruments to the students who agreed to participate, in a classroom environment and face-to-face. This took approximately 15 min.

Instruments

Information form

It contains information about the age, gender, and grade level of the participants. To improve its reliability, the final version was developed by considering the opinions of field experts.

Career exploration outcome expectations scale

The Career Exploration Outcome Expectations Scale was developed by Oliveira et al. [14] to measure middle-school students' career exploration outcome expectations, and adapted into Turkish by Camadan and Sari [73]. It is graded on a 4-point Likert scale with 1 = very low probability, 2 = low probability, 3 = high probability, and 4 = very high probability. As an individual's career research outcome expectations increase, the score they receive on the scale also increases. The validity and reliability studies of the scale were conducted on individuals between the ages

of 12 and 16 years. According to the confirmatory factor analysis conducted to determine the validity of the scale, it was determined that the goodness of fit values obtained were at an acceptable level (χ^2 = 346.9, df = 87, TLI = 0.92, CFI = 0.93, RMSEA = 0.05, SRMR = 0.05). The Cronbach's α value calculated to determine the reliability of the scale was found to be 0.79, and that recalculated for the reliability of the scale within the scope of this study was 0.88. The Cronbach's α recalculated for the reliability of the scale in this study was 0.88.

Metacognitive awareness scale for children (MCAS-C)

The MCAS-C, developed by Sperling et al. [74], was adapted into Turkish by Karakelle and Saraç [32]. The scale, which aims to measure students' metacognitive awareness, comprises two forms: MCAS-C A and MCAS-C B. MCAS-C A is intended for third, fourth, and fifth-grade primary-school students and comprises 12 items and one dimension. MCAS-C B is applied to sixth, seventh, eighth, and ninth-grade students and comprises 18 items and a single dimension. The items are scored on a Likert-type scale from 1 (never) to 5 (always). As an individual's metacognitive skills increase, the score they receive on the scale also increases. The structure validity of the scale was examined by exploratory factor analysis; the Kaiser-Meyer-Olkin (KMO) coefficient calculated to evaluate the adequacy of the sample was 0.86, and Bartlett's test result was significant (1986.87, p < .001). The variance explained for the single-factor structure of the scale was found to be 23.34. As a result of testing the reliability of the scale, the Cronbach's α value was found to be 0.80, and the Cronbach's α value recalculated for the reliability of the scale within the scope of this study was determined to be 0.90.

Parent and peer attachment inventory (PAPI)

The scale, developed by Armsden and Greenberg [75] and adapted into Turkish by Kocayörük [76], aims to determine the attachment levels of adolescents to their parents and peers. Each sub-dimension of the scale—maternal, paternal, and peer attachment styles—contains 18 items. Items are scored on a Likert-type scale from 1 (*Never true*) to 5 (*Always true*). As an individual's attachment level increases, the score they receive on the scale also increases. As a result of the exploratory factor analysis conducted to determine the construct validity of the

Table 1 Descriptive statistics of the variables of the study

scale, the factor loadings of the items were between 0.45 and 0.87. The fit values obtained as a result of the confirmatory factor analysis applied to verify the construct's validity ($\chi^2_{(132)}$ = 282.44, SRMR = 0.055, RMSEA = 0.071, GFI=0.88, AGFI=0.84, CFI=0.92) were found to be at an acceptable level. As a result of testing the reliability of the scale, the Cronbach's α values calculated for each sub-dimension of the scale were 0.91 for attachment style with mother, 0.92 for attachment style with father, and 0.89 for attachment style with peers. The Cronbach's α values recalculated for the reliability of the scale within the scope of this study were found to be 0.90 for attachment style with mother, 0.91 for attachment style with father, and 0.86 for attachment style with peer. The Cronbach's α recalculated for the reliability of the scale in study was 0.90 for attachment style with mother, 0.91 for attachment style with father, and 0.86 for attachment style with peers.

Data analysis

To prevent common method bias, participants were informed during the application of the scales that they should not write their names and surnames while filling out the instruments and that the information they provided would only be used within the scope of the study and would not be shared with anyone else, thus increasing the possibility of participants answering the instruments accurately. Harman's single factor method was also used to check whether there was common method bias in the study [77]. In this method, all statements are subjected to factor analysis without rotation. The majority of the variance (>50%) being explained by a single factor indicates common method bias [78]. The factor analysis conducted for this purpose found that the statements collected under a single factor explained 19% of the variance (<50%). Therefore, there was no common method bias in the research.

Subsequently, we examined whether any values were missing in the dataset and determined that none were missing. Next, the data were examined for compliance with the parametric standards, and the skewness and kurtosis values of the variables were calculated (Table 1). For the values of the variables to be normally distributed, skewness should be less than |3|, and kurtosis should be less than |10 [79]. The skewness and kurtosis values in Table 1 demonstrate a normal distribution. Additionally,

Variables	n	Min.	Max.	x	Ss	Skewness	Kurtosis
Metacognitive Skills	318	1.00	5.00	3.91	0.69	- 0.565	0.482
Career Exploration Outcome Expectations	318	1.00	4.00	3.12	0.58	-0.564	0.063
Attachment Style with Mother	318	1.61	5.00	4.09	0.73	-1.096	0.776
Attachment Style with Father	318	1.44	5.00	3.84	0.85	-0.771	-0.161
Attachment Style with Peer	318	1.44	5.00	3.86	0.73	-0.640	-0.003

to determine whether the variables were normally distributed, the presence of extreme values in the dataset was examined by calculating z-scores. The analyses showed that no values had z-scores less than -4 and greater than +4; thus, the data were normally distributed. To perform regression analysis, whether there is a multicollinearity problem between the independent variables should be tested [80]. A correlation between the independent variables above 0.90 indicates a multicollinearity problem [81]. According to the results of the Pearson correlation analysis, the correlation coefficients between the independent variables in this study were between 0.654 and 0.223 (Table 2), thus indicating no multicollinearity problem. The variance inflation factor (VIF) and tolerance value (TV) should also be calculated to test for multicollinearity problem. To avoid a multicollinearity problem, the VIF value should be less than 10, and TV should be greater than 0.2 [82]. The TV and VIF values calculated for the independent variables in this study are as follows: metacognitive skills: TV = 0.865, VIF = 1.156; maternal attachment style: TV = 0.666, VIF = 1.502; paternal attachment style: TV = 0.651, VIF = 1.537; peer attachment style: TV = 0.800, VIF = 1.250. According to these results, the assumptions required for regression analysis were met. The data were analyzed based on these results. SPSS 25.0 Process Macro 4.1 version "Model 6" developed by Hayes was used for the multiple mediation analysis conducted to determine whether the mediating variables (maternal[M1], paternal[M2], and peer [M3] and attachment styles) have a significant role in explaining the independent variable (metacognitive skills [X]) and the dependent variable (career exploration outcome expectations [Y]). A bootstrap sampling technique was used for data analysis. The confidence interval values were estimated for correlation and mediation analysis by means of bias correction and bootstrapping (N = 10.000). Additionally, the frequency, minimum, maximum, arithmetic mean, and standard deviation values were calculated for the study variables.

 Table 2
 Correlations between variables

Variables	(1)	(2)	(3)	(4)	(5)
(1) Metacognitive Skills	1	0.654**	0.285**	0.337**	0.223**
(2) Career Exploration Out- come Expectations		1	0.281**	0.312**	0.225**
(3) Attachment Style with Mother			1	0.534**	0.391**
(4) Attachment Style with Father				1	0.381**
(5) Attachment Style with Peer					1
Mean	3.907	3.121	4.086	3.840	3.860
Sd	0.694	0.586	0.733	0.856	0.736
^{**} <i>p</i> <.01					

Results

Table 1 presents descriptive statistics regarding the variables of the study, metacognitive skills, career research outcome expectations, and maternal, paternal, and peer attachment styles.

The arithmetic means (\bar{x}) of the variables are as follows: metacognitive skills: 3.91 (SD = 0.69), career exploration outcome expectancy: 3.12 (SD = 0.58), maternal attachment style: 4.09 (SD = 0.73), paternal attachment style: 3.84 (SD = 0.85), and peer attachment style: 3.86 (SD = 0.73). The skewness values of the variables were between -1.096 and -0.564, and kurtosis values were between 0.776 and -0.003. Table 2 presents the relationships between the research variables.

All the relationships between metacognitive skills and career exploration outcome expectations (r=.654, p <.01), maternal attachment style (r=.285, p <.01), paternal attachment style (r=.337, p <.01), and peer attachment style (r=.223, p <.01) are positive and significant. All the relationships between career exploration outcome expectations and maternal attachment style (r=.281, p <.01), paternal attachment style (r=.281, p <.01), paternal attachment style (r=.312, p <.01), and peer attachment style (r=.225, p <.01) are positive and significant. All the relationships between maternal attachment style (r=.534, p <.01) and peer attachment style (r=.391, p <.01) are positive and significant. Finally, the relationship between paternal attachment style is also positive and significant (r=.381, p <.01).

This study first sought to determine whether a co-variation exists between the metacognitive skills and career exploration outcome expectations of secondary-school students and the degree of any such co-variation. Next, it examined the relationships between metacognitive skills and maternal, paternal, and peer attachment styles. Subsequently, the relationships between maternal, paternal, and peerattachment styles and career exploration outcome expectancy were tested. Finally, in the case of a significant relationship between metacognitive skills and career exploration outcome expectancy, the study examined whether maternal, paternal, and peer attachment mediate this relationship; for this purpose, Hayes (process) analysis was conducted. The results of the regression analysis based on the bootstrap method are presented in Table 3.

Table 3 reveals that the independent variable, metacognitive skills, positively and significantly predicted the dependent variable career exploration outcome expectations (b=0.513, %95 BCA CI [0.437–0.588]). Thus, H_1 was confirmed. Additionally, metacognitive skills positively and significantly predicted the mediating variables maternal attachment style (b=0.301, %95 BCA CI [0.189–0.413]) and paternal attachment style (b=0.248, %95 BCA CI [0.131–0.365]), but did not significantly

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	M,				M_2				M₃				۲			
Independent Variables	В	SE	ITCI	NLCI	<i>p</i>	SE	ILLI	NLCI	p	SE	ITCI	NLCI	<i>p</i>	SE	LLCI	NLCI
Direct Effects																
×	0.301**	0.057	0.189	0.413	0.248**	090.0	0.131	0.365	0.082	0.057	-0.031	0.195	0.513**	0.038	0.437	0.588
M1		ı	ı	ı	ı	ı	ı	ı					0.048	0.041	- 0.034	0.129
M ₂	,	ı	ı		ı	ı	ı	ı					0.040	0.036	- 0:030	0.110
M ₃	,	ı		,	ı	·	ı	ı					0.035	0.038	- 0.039	0.109
Constant	2.910**	0.226	2.466	3.354	0.596	0.280	0.047	1.148	1.781**	0.264	1.261	2.301	0.634**	0.188	0.263	1.005
	$R^2 = 0.081$				$R^2 = 0.322$				$R^2 = 0.200$				$R^2 = 0.442$			
Indirect Effects	<i>q</i>	SE	LLCI	NLCI	Completely	/ Standardi	zed Indire	ict Effect Si	ize							
$X \to M_1 \to Y$	0.014	0.013	- 0.009	0.042	(b = 0.047, 5)	%95 BCA CI	[0.010-0.	([060								
$X \to M_2 \to Y$	0.010	0.009	- 0.006	0.032												
$X \to M_3 \to Y$	0.003	0.005	- 0.005	0.016												
$X \rightarrow M_1 + M_2 \rightarrow Y$	0.007	0.006	- 0.005	0.018												
$X \rightarrow M_1 + M_3 \rightarrow Y$	0.003	0.003	- 0.003	0.010												
$X \rightarrow M_2 + M_3 \rightarrow Y$	0.002	0.002	- 0.002	0.007												
$X \rightarrow M_1 + M_2 + M_3 \rightarrow Y$	0.001	0.002	- 0.002	0.007												

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Fig. 1 Findings related to the hypothetical model of the study: Model 6. (X: Independent variables, Y: Dependent variables, M₁: Mediator 1, M₂: Mediator 2, M₃: Mediator 3) (Hayes, 2013)

predict peer attachment style (b = 0.082, %95 BCA CI [-0.031–0.195]). Thus, H₂ and H₃ were confirmed, while H₄ was not confirmed. Maternal attachment style (b = 0.048, 95% CI [-0.034–0.129]), paternal attachment style (b = 0.040, 95% CI [-0.030–0.110]), and peer attachment style (b = 0.035, 95% CI [-0.039–0.109]) were not significant predictors of career exploration outcome expectations. Thus, H₅, H₆, and H₇ were not confirmed.

In determining the effect size of predictor variables on career search outcome expectation according to the standardized regression coefficient (β), the formula $f^2 = R^2/(1-R^2)$ was used, and $0.02 \le f^2 < 0.15$ was accepted as low level effect, $0.15 \le f^2 < 0.35$ as medium level effect, and $0.35 \le f^2 < \dots$ as large level effect [83]. The R² values in this formula were calculated by simple linear regression analysis to determine the explanation status of each independent variable on the dependent variable. Metacognitive skills had a large level effect in explaining career search outcome expectations ($f^2 = 0.74$). Maternal attachment style ($f^2 = 0.09$), paternal attachment style ($f^2 = 0.10$), and peer attachment style ($f^2 = 0.05$) had low level effects in explaining career research outcome expectation. Thus, the order of importance in explaining career research outcome expectation was metacognitive skills, paternal attachment style, maternal attachment style, and peer attachment style, respectively.

The indirect effects in Table 3 demonstrate that metacognitive skills predicts career exploration outcome expectations, in terms of maternal attachment style (b=0.014, 95% CI [-0.009-0.042]), father attachment style (b=0.010, 95% CI [-0.006-0.032]) and peer attachment style (b=0.003, 95% CI [-0.005-0.016]) in explaining career exploration outcome expectations. However, metacognitive skills did not have a significant mediating role in explaining career exploration outcome expectations together with maternal and paternal attachment styles (b = 0.007, 95% CI [0.018–-0.005]), maternal and peer attachment styles(b = 0.003, 95% CI [-0.003–0.010]), or paternal and peer attachment styles(b = 0.002, 95% CI [-0.002–0.007]). Additionally, metacognitive skills did not have a significant mediating role in explaining career exploration outcome expectations, together with maternal, paternal, and peer attachment styles (b = 0.001, 95% CI [-0.002–0.007]).

The fully standardized effect size of the mediation effect in Table 3 is $K^2 = 0.047$. Effect size values close to 0.01, 0.09, and 0.25 are considered low, medium, and high effects, respectively [84]. In this context, the mediation effect in the tested model is close to the low effect size. Other values obtained for the tested model are presented in Fig. 1.

Figure 1 shows that metacognitive skills is positively and significantly related to career exploration outcome expectations, before the mediating variables are included $(c = 0.552^{**})$. When the mediating variables are added to this relationship, the positive and significant relationship between the independent and dependent variables continues ($c1 = 0.513^{**}$). Thus, when maternal, paternal, and peer attachment styles were added to the relationship between metacognitive skills and career exploration outcome expectations, the relationship between metacognitive skills and career exploration outcome expectations increased to a certain extent. Nonetheless, its direction and significance did not change. In other words, maternal, paternal, and peer attachment styles did not significantly mediate the relationship between metacognitive skills and career exploration outcome expectations. Thus, H_8 was not confirmed. According to all the results, H_{1-3} were accepted, and H_{4-8} were rejected.

These findings should be interpreted together with the other finding of the study that paternal, maternal, and peer attachment styles had low level effects in explaining the career research result expectation. The statistically insignificant relationships between the mediator variables and the dependent variable should not be interpreted as there is no relationship between these variables. Therefore, it would be appropriate to be more cautious and avoid definitive judgments in the interpretation of the findings obtained.

Discussion, conclusion, and recommendations

This study examined whether maternal, paternal, and peer attachment styles mediate the relationship between metacognitive skills and career exploration outcome expectations of middle-school students. The analyses revealed that metacognitive skills positively and significantly predicted career exploration outcome expectations. In other words, a person is more likely to employ their metacognitive abilities and have realistic career exploration outcome expectations if they are more conscious of them. Research supporting this result has shown that metacognitive skills are a significant predictor of the career development process [2, 3, 19].

A person with metacognitive skills monitors their performance [34] and attempts to apply their thinking abilities to the fullest extent possible during this process [56, 85]. Notably, these abilities are necessary for the individual to make the best choice throughout the career discovery process, and the more aware of their metacognitive skills they are, the more accurate their career discovery process. Both metacognitive skills and career exploration outcome expectations require systematic thinking in learning, planning the relevant process, and making the right decisions. In this respect, individuals make more effective decisions in their career processes as their use of metacognitive skills increases.

We found that metacognitive skills positively and significantly predicted maternal and paternal attachment styles but not peer attachment styles. People who grew up with a stable attachment style are anticipated tomake use of these bonds when they are adolescent and young. The socialization process is a process in which metacognitive skills such as research, establishing cause-andeffect relationships, and hypothetical thinking are utilized [86, 87]. The participants in the current study possibly thought more about career exploration when answering the questions and did not pay enough attention to this point. Although few studies have directly addressed the relationship between metacognitive skills and maternal, paternal, and peer attachment styles, Turan and İskender [35] concluded that perceived peer social support is a significant predictor of metacognitive awareness. Furthermore, the protective impact of metacognitive skill development in attachment issues was highlighted by Yavuz et al. [88]. According to Tavakolizadeh et al. [89], people who are securely attached employ greater metacognitive abilities. According to Demirdögen et al. [90], people with insecure attachment styles are more likely to have depressive symptoms if they have metacognitive issues. According to these results, an individual's metacognitive skills, which include activities such as planning, executing, monitoring, and evaluating a learning process, are not independent of the attachment relationship the individual develops with their parents. In this context, meeting an individual's interests and needs safely, showing an accepting approach to them, and establishing a strong bond with their parents contribute to the effective execution of their cognitive processes. This situation remains valid throughout the individual's secondaryschool years. Conversely, the attachment that individuals develop with their peers is not reflected in their metacognitive skills. However, they spend a substantial amount of time with their friends in middle-school and engage in social and emotional or social sharing. In other words, the attachment that an individual develops with their parents maintains its effect in the following years and has more meaning in thinking skills than the attachment with peers.

We found that no significant relationship exists between the scores obtained from the maternal, paternal, and peer attachment inventory and those obtained from the Career Exploration Outcome Expectations Scale. By contrast, Mert et al. [92] found a positive and significant relationship between perceived family and friend social support and career decision-making self-efficacy. Similarly, some studies have found a positive relationship between individuals' career development and the social support they receive from family and friends [35, 91, 92]. Significant relationships have been found between secure attachment to parents and individuals' exploration of self and environmental opportunities [42, 43], commitment to career choice [41], career self-efficacy belief [44], career maturity [45], and career decision-making process [46]. Thus, previous research findings suggest that career development and exploration may be related to attachment types. There are several explanations for why the current study did not provide the anticipated outcomes. First, people who have a strong bond with their parents or friends are said to be able to make sensible decisions in their lives [93]. However, vocational choice is still seen as a challenge in Turkey today, as most young people are unable to adequately explore themselves and their professional goals during their secondary-school years [94]. Thus, the participants in the research may not have seem affected much by the attachment dynamics in the career discovery process. Rather than concentrating on outcome expectations, they considered finding employment and concentrating on the outcomes of their professional growth. The second significant problem is the underutilization of career resources, particularly in the areas of career development and discovery, with an emphasis on online career prospects. Turning to what is popular throughout the job search and finding process instead of one's own dynamics subsequently causes discontent with the career one finds. Among the reasons why the research hypotheses are unimportant, these can be demonstrated in particular. These reasons can be shown specifically among the reasons why the research hypotheses are insignificant.

Although this study found a direct positive and significant relationship between metacognitive skills and career research outcome expectations, maternal, paternal, and peer attachment styles did not significantly affect this relationship. In other words, when the mediating variables of maternal, paternal, and peer attachment styles are added to the relationship between metacognitive skills and career exploration outcome expectations, the relationship decreases, but this decrease is not statistically significant. The results obtained in the study are consistent with studies that have revealed the relationship between career development and metacognitive skills [1, 2, 56]. Karslı [95] noted that functionality in metacognitive skills may be an important predictor of decision-making and locus of control in primary-school adolescents. Thinking about which sector to work in, gathering information about professions, making career plans, and reorganizing these processes when necessary are closely related to metacognitive skills. Therefore, individuals with higher levels of metacognitive thinking skills have higher career exploration behaviors and higher outcome expectation beliefs. Moreover, the fact that maternal, paternal, and peer attachment styles do not significantly affect career exploration outcome expectations can be interpreted as meaning that the attachment style that secondary-school students have established is not significantly reflected in their career processes. These results show that several different factors other than metacognitive skills affect students' career processes, and one of these factors may be the Internet environment. Secondary-school students in Turkey spend a lot of time on the Internet, which also affects their career processes [95].

The study has some limitations. First, owing to budget constraints, the sample was limited to students from one secondary school in Rize province. In future efforts, we aim to reach a wider range of districts and schools, which will allow us to generalize our findings. Second, self-report surveys were relied upon, which are subject to personal bias and emotional factors. Additional limitations include the self-reported nature of the measures and the potential impact of the common-method variance. Lastly, it is considered that the study may not have sufficient statistical power to detect small but significant mediating effects due to the limited sample size. A power analysis based on the general regression model was performed within the scope of the study. However, larger samples are needed to detect mediating effects [96, 97]. In addition, it is estimated that measurement error is a possible factor that may affect the results of the study.

Theoretical implications

A person's cognitive and emotional traits are crucial for the healthy advancement of career exploration and associated aspirations, which are a significant component of lifetime career development. According to this study, people's expectations for the results of their job exploration are positively impacted by the use of metacognitive skills. A successful job choice is directly correlated with how much youngsters investigate their surroundings and themselves during early career development. In this study the effect of the mental skills used has been revealed. But the context of the exploration process is rather wide. Identifying additional behavioral and emotional factors that influence this process is crucial. The second crucial aspect is that metacognitive abilities are significantly impacted by a stable bond to one's parents. One of the simplest explanations for personality is attachment. It is crucial that a person who has a strong bond with his family employs higher cognitive abilities to comprehend his surroundings. In interpreting the results obtained from the study, it would be appropriate to consider the secondary school students where the application was made and to avoid generalization. In addition, it was observed that the attachment style with the father, the attachment style with the mother and the attachment style with the friend had a low level of effect in explaining the career research result expectation. In order to overcome these limitations, the Nomenclature of Territorial Units for Statistics (NUTS) [98] put forward by the Turkish Statistical Institute (TUIK) can be taken into account in future studies. Thus, by applying to secondary school students with higher representativeness and a larger sample group, the statistical power of the findings can be increased and more generalizable results can be reached. Alternative explanations and models (e.g., a model in which attachment plays a moderating role) should be tested in future studies. Due to the cross-sectional nature of the design of this study, it is not appropriate to reach a conclusion regarding the cause and effect relationship between the variables. In order to observe the changes over time, understand the causal relationships and increase the validity of the results, experimental or longitudinal research studies can be conducted. The results of studies based on such designs can support the results of this study.

Managerial implications

Schools play a significant role in supporting the lifelong process of career development. Attachment types and expectations for career exploration outcomes did not significantly correlate within the parameters of this study. In the framework of the literature, it was deemed useful to identify the attachment styles that middle school children had in order to navigate the job search process in the most healthful manner. For this reason, early identification and rehabilitation of children with peer and family issues, as well as regular assessment of children at risk by school psychologists, are crucial. These children must be nurtured in order to live a healthy discovery process and be able to accurately identify occupations. The school psychological counselor can offer this support in person. It is possible to ascertain the child's level of career exploration and maturity. It is possible to organize both direct and indirect experiences for their development. Again, it was shown that there was no relationship between attachment types and metacognitive abilities within the parameters of the study. There are conflicting findings in the literature. People who are securely bonded are more self-aware. It is believed that they employ a wide range of cognitive abilities to provide this awareness. In various samples, the topic may be reexamined. School psychologists should concentrate on research that will help kids explore who they are. This endeavor will encourage the application of additional metacognitive abilities. Finally, school psychologists can design intervention programs that help kids and teenagers become more adaptable in their careers.

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Author contributions

SVS, FC, and SO collaborated on the research design design. SVS and SO made significant contributions to the data collection process. SVS and FC contributed significantly to data analysis and interpretation. SVS, FC, and SO read and approved the final draft of the manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

Permission for the research was obtained from the Recep Tayyip Erdoğan University Social and Human Sciences Ethics Committee in the context of the Internal Review Board (IRB) in the Ethics Approval declaration. The prepared consent form complies with the ethics committee regulations and the ethics committee permission was obtained for the data collection process. Before the data collection process, the families of all participants were informed, consent forms were filled out and permissions were obtained. We confirm that all practices in the article were carried out in accordance with relevant guidelines and regulations, such as the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

- Karaca-Atik A, Meeuwisse M, Gorgievski M, Smeets G. Uncovering important 21st-century skills for sustainable career development of social sciences graduates: A systematic review. Educational Res Rev. 2023;39:1–15.
- Eryılmaz A, Mutlu T. Career development and mental health from the perspective of life-span development approach. Curr Approaches Psychiatry. 2017;9(2):227–49.
- Chui H, Li H, Ngo HY. Linking protean career orientation with career optimism: career adaptability and career decision self-efficacy as mediators. J Career Dev. 2022;49(1):161–73.
- Kleine AK, Schmitt A, Wisse B. Students' career exploration: A meta-analysis. J Vocat Behav. 2021;131:1–18.
- Sawitri DR, Creed PA, Perdhana MS. The discrepancies between individual-set and parent-set career goals scale: development and initial validation. J Career Dev. 2021;48(5):654–69.
- Super DE, Crites JO, Hummel RD, Mosher HP, Overstreet PL, Warnath CF. Vocational development: A framework for research. New York: Teachers College, Bureau of; 1957.
- Ochs LA, Roessler RT. Predictors of career exploration intentions: A social cognitive career theory perspective. Rehabilitation Couns Bull. 2004;47(4):224–33. https://doi.org/10.1177/003435520404700404.
- Lent RW, Brown SD, Larkin KC. Relation of self-efficacy expectations to academic achievement and persistence. J Couns Psychol. 1984;31(3):356. https:// doi.org/10.1037/0022-0167.31.3.356.
- Betz NE, Voyten KK. Efficacy and outcome expectations influence career exploration and decidedness. Career Dev Q. 1997;46(2):179–89. https://doi.or g/10.1002/j.2161-0045.1997.tb01004.x.
- Bandura A. Social foundations of thought and action: A social cognitive theory. Prentice-Hall, Inc.; 1986.
- Lent RW, Sheu HB, Singley D, Schmidt JA, Schmidt LC, Gloster CS. Longitudinal relations of self-efficacy to outcome expectations, interests, and major choice goals in engineering students. J Vocat Behav. 2008;73(2):328–35. https ://doi.org/10.1016/j.jvb.2008.07.005.
- Fouad NA, Smith PL, Enochs L. Reliability and validity evidence for the middle school self-efficacy scale. Meas Evaluation Couns Dev. 1997;30(1):17–31. http s://doi.org/10.1080/07481756.1997.12068914.
- Duffy RD, Lent RW. Relation of religious support to career decision selfefficacy in college students. J Career Assess. 2008;16(3):360–9. https://doi.org /10.1177/106907270831738.
- 14. Oliveira ÍM, Taveira MDC, Cadime I, Porfeli EJ. Psychometric properties of a career exploratory outcome expectations measure. J Career Assess. 2016;24(2):380–96. https://doi.org/10.1177/1069072715580.
- Patton W, Porfeli EJ. Career exploration for children and adolescents. In Career development in childhood and adolescence (pp. 47–69). Brill; 2007.
- Niles MT, Ahuja R, Barker T, Esquivel J, Gutterman S, Heller MC, Vermeulen S. Climate change mitigation beyond agriculture: a review of food system opportunities and implications. Renewable Agric Food Syst. 2018;33(3):297– 308. https://doi.org/10.1017/S1742170518000029.
- 17. Elkind D. Understanding the young adolescent. The life cycle: readings in human development. Columbia University; 1981. pp. 167–76.

- Gibson WA. Elementary and middle school teachers' perceptions of bullying[Master Thesis, Georgia State University]. ProQuest Dissertations and Theses Global; 2003.
- Zunker VG. Career counseling: applied concepts of life planning. 6th ed. Brooks/Cole; 2002.
- Patton W, McMahon M. The systems theory framework of career development. Career development and systems theory. Brill; 2021. pp. 67–107.
- 21. Peskin H, Jones CJ, Livson N. Personal warmth and psychological health at midlife. J Adult Dev. 1997;4:71–83. https://doi.org/10.1007/BF02510082.
- 22. Cheng FC, Wang LH, Wang YC, Chiang CP. The influence of dentist parents on their children's career decision-making for dentistry or medicine. J Dent Sci. 2024;19(1):678. https://doi.org/10.1016/j.jds.2023.10.003.
- Flavell JH. Metacognition and cognitive monitoring: A new area of cognitive– developmental inquiry. Am Psychol. 1979;34(10):906–11. https://doi.org/10.1 037/0003-066X.34.10.906.
- 24. Fernandez-Duque D, Thornton IM. Change detection without awareness: do explicit reports underestimate the representation of change in the visual system? Visual Cognition. 2000;7(1–3):323–44. https://doi.org/10.1080/13506 2800394838.
- Hıdıroğlu ÇN. A critical look at the role of metacognition in the metacognition comprehension and problem solving process. Pamukkale Univ Social Sci Inst J. 2018;32:87–103. https://doi.org/10.30794/pausbed.424862.
- Ku KY, Ho IT. Metacognitive strategies that enhance critical thinking. Metacognition Learn. 2010;5:251–67. https://doi.org/10.1007/s11409-010-9060-6.
- 27. Magno C. The role of metacognitive skills in developing critical thinking. Metacognition Learn. 2010;5:137–56. https://doi.org/10.1007/s11409-010-90 54-4.
- Schunk DH. Metacognition, self-regulation, and self-regulated learning: research recommendations. EducPsychol Rev. 2008;20:463–7. https://doi.org/ 10.1007/s10648-008-9086-3.
- Katrancı M, Yangın B. The effect of teaching metacognitive strategies on listening comprehension skills and attitudes towards listening. J Adıyaman Univ Social Sci Inst, 2013; (11): 733–71.
- Kaur P, Saini S, Vig D. Metacognition, self-regulation and learning environment as determinant of academic achievement. Indian J Health Wellbeing. 2018;9(5):1–14.
- Landine J, Stewart J. Relationship between metcognition, motivation, locus of control, self-efficacy, and academic achievement. Can J Counselling Psychother. 1998;32(3):200–2012.
- Karakelle S, Saraç SA. Validity and factor structure of Turkish versions of the metacognitive awareness inventory for children (Jr. MAI) - A and B forms. Turkish Psychol Articles. 2007;10(20):87–103.
- Solso RL. Prototypes, schemata, and the form of human knowledge: the cognition of abstraction. Current issues in cognitive processes. Psychology; 2014. pp. 345–68.
- Gul F, Shehzad S. Relationship between metacognition, goal orientation, and academic achievement. Procedia - Social Behav Sci. 2012;47:1864–8. https://d oi.org/10.1016/j.sbspro.2012.06.914.
- Turan ME, İskender M. The relationship between career and talent development self-efficacy, metacognitive awareness, life satisfaction and perceived peer social support in adolescents. Ekev Acad Magazine, 2020; (84): 435–48.
- 36. Ainsworth MS. Attachments beyond infancy. Am Psychol. 1989;44(4):709–16. https://doi.org/10.1037/0003-066X.44.4.709.
- Bowlby J. Attachment and loss: retrospect and prospect. Am J Orthopsychiatry. 1982;52(4):664–78. https://doi.org/10.1111/j.19390025.1982.tb01456.
- Gaugler JE, Teaster P. The family caregiving career: implications for community-based long-term care practice and policy. J Aging Soc Policy. 2006;18(3–4):141–54. https://doi.org/10.1300/J031v18n03_10.
- Stevenson-Hinde J. Attachment theory and John Bowlby: some reflections. Attach Hum Dev. 2007;9(4):337–42. https://doi.org/10.1080/14616730701711 540.
- 40. Santrock JW. Life-span development (Trans. Ed. G. Yüksel). Ankara: Nobel Academic Publishing Education; 2015.
- Blustein DL, Walbridge MM, Friedlander ML, Palladino DE. Contributions of psychological separation and parental attachment to the career development process. J Couns Psychol. 1991;38(1):39.
- 42. Blustein DL. Toward a contextual perspective of the School-to-Work transition: A reaction to Feij. J Vocat Behav. 1995;46(3):257–65. https://doi.org/10.10 06/jvbe.1995.1018.
- Ketterson TU, Blustein DL. Attachment relationships and the career exploration process. Career Dev Q. 1997;46(2):167–78. https://doi.org/10.1002/j.2161 -0045.1997.tb01003.x.

- 44. O'Brien KM. The influence of psychological separation and parental attachment on the career development of adolescent women. J Vocat Behav. 1996;48:257–74. https://doi.org/10.1111/j.2041-6962.1996.tb00796.x.
- Lee HY, Hughey KF. The relationship of psychological separation and parental attachment to the career maturity of college. J Career Dev. 2001;27:279–93. h ttps://doi.org/10.1023/A:1007855104473.
- Wolfe JB, Betz NE. The relationship of attachment variables to career decisionmaking self-efficacy and fear of commitment. Career Dev Q. 2004;52(4):363– 9. https://doi.org/10.1002/j.2161-0045.2004.tb00952.x.
- Dursun A, Kara A. Career decision competence expectation and family influence on career choice as predictors of career decision-making difficulties among secondary school students. Turkish J Educational Sci. 2019;17(1):39–55.
- Koçakoğlu MG, Yalçın B. Kariyer gelişim Sürecinde aile. Int Social Mentality Researcher Thinkers J. 2020;6(37):1921–9. https://doi.org/10.31576/smryj.658.
- Özünlü MB, Bacanlı F. Adaptation of the family influence on career choice scale to Turkish for high school students: validity and reliability studies. Turkish J Educational Sci. 2015;13(1):13–32.
- Bacanlı F, Sürücü M. Examining the relationships between primary school students' career development and attachment to parents. Turkish Educational Sci J. 2011;9(4):679–700.
- Lent RW, Brown SD, Hackett G. Toward a unifying social cognitive theory of career and academic interest, choice, and performance. J Vocat Behav. 1994;45(1):79–122.
- Küçükaydın M, Akkanat Avşar Ç, Ayaz E, Sayıcı E. Predictors of science identity in primary school: epistemological beliefs, competency beliefs, and science learning experiences. Int J Sci Educ. 2024;1–23. https://doi.org/10.1080/0950 0693.2024.2361172.
- Hsu AJ, Chen MYC, Shin NF. From academic achievement to career development: does self-regulated learning matter? Int J Educ Vocat Guid. 2022;22(2):285–305. https://doi.org/10.1007/s10775-021-09486-z.
- Hurley L. A quantitative analysis investigating career decision making difficulties, self-efficacy and ego identity status among college students. [Unpublished Master Thesis, Dublin School of Arts]. ProQuest Dissertations and Theses Global; 2013.
- Lent RW, Brown SD. Social cognitive model of career self-management: toward a unifying view of adaptive career behavior across the life span. J Couns Psychol. 2013;60(4):557.
- 56. Zimmerman BJ. Self-regulated learning and academic achievement: an overview. Educational Psychol. 1990;25(1):3–17.
- Chien JC, Fischer JM, Biller E. Evaluating a metacognitive and planned happenstance career training course for Taiwanese college students. J Employ Couns. 2006;43(4):146–53. https://doi.org/10.1002/j.2161-1920.2006.tb00014.
 x.
- Byars-Winston AM, Fouad NA. Metacognition and multicultural competence: expanding the culturally appropriate career counseling model. Career Dev Q. 2006;54(3):187–201. https://doi.org/10.1002/j.2161-0045.2006.tb00151.x.
- 59. Nawaz S, Gilani N. Relationship of parental and peer attachment bonds with career Decision-Making Self-Efficacy among adolescents and Post-Adolescents. J Behav Sci. 2011;21(1):33–47.
- Qudsiyah U, Wibowo ME, Mulawarman M. The influence of parental attachment to career maturity with self efficacy as mediator. Jurnal Bimbingan Konseling. 2018;7(1):41–7.
- Vignoli E, Croity-Belz S, Chapeland V, de Fillipis A, Garcia M. Career exploration in adolescents: the role of anxiety, attachment, and parenting style. J Vocat Behav. 2005;67(2):153–68. https://doi.org/10.1016/j.jvb.2004.08.006.
- 62. Karasar N. Scientific research method. 33rd ed. Ankara: Nobel Academic Publishing; 2018.
- 63. Cohen L, Manion L, Morrison K. Research methods in education. 5th ed. Routledge; 2000.
- 64. Teddlie C, Tashakkori A. Foundations of mixed methods research: integrating quantitative and qualitative approaches in the social and behavioral sciences. Sage; 2009.
- Turkish Ministry of National Education. Central exam application and implementation guide for secondary education institutions admitting students by exam. https://www.meb.gov.tr/mebiysdosyalar/202403/121016382024Merke ziSYnavBasYvuruKYlavuzu.pdf; 2024.
- Turkish Ministry of National Education. Central exam results.https://www.me b.gov.tr/lgs-kapsamindaki-merkez-sinav-sonuclari-aciklandi/haber/34178/tr; 2024.
- 67. Fraenkel RJ, Wallen EN. How to design and evaluate research in education. New York: McGraw-Hill; 2006.

- Christensen LB, Johnson RB, Turner LA. Research methods, design, and analysis. 12th ed. Pearson; 2015.
- Kline R. Principles and practice of structural equation modeling. 3nd ed. b.). New York: Guilford; 2011.
- Murphy KR, Myors B. Statistical power analysis, a simple and general model for traditional and modern hypothesis test. London: Lawrence Erlbaum Associates; 2004.
- Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G* power 3.1: tests for correlation and regression analyses. Behav Res Methods. 2009;41(4):1149–60. https://doi.org/10.3758/BRM.41.4.1149.
- 72. Kang H. Sample size determination and power analysis using the G* power software. J Educational Evaluation Health Professions. 2021;18:1–12. https://d oi.org/10.3352/jeehp.2021.18.17.
- 73. Camadan F, Sari SV. Forgiveness, locus of control, and perfectionism: a mixed method study. Int J Progressive Educ. 2021;17(1):210–31.
- Sperling RA, Howard BC, Miller LA, Murphy C. Measures of children's knowledge and regulation of cognition. Contemp Educ Psychol. 2002;27(1):51–79. https://doi.org/10.1006/ceps.2001.1091.
- Armsden GC, Greenberg MT. The inventory of parent and peer attachment: individual differences and their relationship to psychological well-being in adolescence. J Youth Adolesc. 1987;16(5):427–54. https://doi.org/10.1007/BF0 2202939.
- Kocayörük E. A Turkish adaptation of the inventory of parent and peer attachment: the reliability and validity study. Eurasian J Educational Res. 2010;40(40):133–50.
- 77. Harman HH. Modern factor analysis. Chicago: University of Chicago Press; 1976.
- Podsakoff PM, MacKenzie SB, Lee JY, Podsakoff NP. Common method biases in behavioral research: a critical review of the literature and recommended remedies. J Appl Psychol. 2003;88(5):879.
- 79. Mertler CA, Vannatta RA, LaVenia KN. Advanced and multivariate statistical methods: practical application and interpretation. Routledge; 2021.
- Cohen J, Cohen P, West SG, Aiken LS. Applied multiple regression/correlation analysis for the behavioral sciences. 3rd ed. Routledge; 2013.
- 81. Pallant J. SPSS survival manual: A step by step guide to data analysis using IBM SPSS. Routledge; 2020.
- Field AP, Miles J, Field Z. Discovering statistics using R. London: Sage Publication; 2012.
- Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale, NJ: Lawrence Earlbaum Associates; 1988.
- Preacher KJ, Kelley K. Effect size measures for mediation models: quantitative strategies for communicating indirect effects. Psychol Methods. 2011;16(2):93–115. https://doi.org/10.1037/a0022658.
- Vrugt A, Oort FJ. Metacognition, achievement goals, study strategies and academic achievement: pathways to achievement. Metacognition Learn. 2008;3:123–46.
- Allen JP, Manning N. From safety to affect regulation: attachment from the vantage point of adolescence. New Dir Child Adolesc Dev. 2007;11723–39. ht tps://doi.org/10.1002/cd.192.

- Salonen P, Vauras M, Efklides A. Social interaction-what can it tell Us about metacognition and coregulation in learning? Eur Psychol. 2005;10(3):199– 208. https://doi.org/10.1027/1016-9040.10.3.199.
- Yavuz M, Aluç N, Tasa H, Hamamcıoğlu İ, Bolat N. The relationships between attachment quality, metacognition, and somatization in adolescents: the mediator role of metacognition. J Child Adolesc Psychiatric Nurs. 2019;32(1):33–9. https://doi.org/10.1111/jcap.12224.
- Tavakolizadeh J, Tabari J, Akbari A. Academic self-efficacy: predictive role of attachment styles and meta-cognitive skills. Procedia-Social Behav Sci. 2015;171:113–20. https://doi.org/10.1016/j.sbspro.2015.01.096.
- Demirdöğen EŞ, Ünlü N, Aluç N, Sönmez E, Ekiz B, Çalkan B, Yavuz M. The relationships among attachment quality, depressive symptom levels, and metacognition problems in adolescents. Turkish J Child Adolesc Mental Health. 2021;28(2):131–7. https://doi.org/10.4274/tjcamh.galenos.2021.7918 8.
- Kanten S, Kanten P, Yeşiltaş M. The role of career self-efficacy on the effect of parental career behaviors on career exploration: A study on school of tourism and hotel management' students. Eur J Multidisciplinary Stud. 2021;6(1):152– 71. https://doi.org/10.26417/ejms.v3i1.p143-154.
- Mert A, Ekin-Duman A, Kahraman M. Self-Esteem and perceived social support as the tires of career decision-making self sufficiency in secondary school students. Yüzüncüyil Univ J Fac Educ. 2019;16(1):594–619. https://doi. org/10.23891/efdyyu.2019.183.
- Wang H, Jiao R. The relationship between career social support and career management competency: the mediating role of career decision-making self-efficacy. Curr Psychol. 2023;42(26):23018–27. https://doi.org/10.1007/s12 144-022-03418-y.
- 94. Yavaş EN. Education-employment relationship and youth unemployment problem in Turkey [Master's thesis, Bursa Uludag University]. ProQuest Dissertations and Theses Global; 2022.
- Karsli T. Examining the relationship between metacognitive functions and decision-making and locus of control in primary school adolescents. Electron J Social Sci. 2015;14(55):16–31.
- Fritz MS, MacKinnon DP. Required sample size to detect the mediated effect. Psychol Sci. 2007;18(3):233–9. https://doi.org/10.1111/j.1467-9280.2007.0188 2x.
- Hayes AF, Scharkow M. The relative trustworthiness of Inferential tests of the indirect effect in statistical mediation analysis: does method really matter? Psychol Sci. 2013;24(10):1918–27. https://doi.org/10.1177/095679761348018
 7.
- Development Agencies. Classification of statistical regional units in development planning. https://ka.gov.tr/sayfalar/kalkinma-planlamasinda-istatistiki-b olge-birimleri-siniflandirmasi--24; 2024.

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