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Adaptation of the Decision-Making Questionnaire Into Turkish: Exploring Its Association With Cognitive Flexibility

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ABSTRACT

Decision making is a cognitive process that considerably influences nearly every aspect of human life, which shapes outcomes and overall well-being of individuals. This study consisted of two parts, in the first part of which the English version of a 64-item decision-making questionnaire was adapted into Turkish. Responses were collected from 22 pilot and 503 main group participants. The adaptation process involved ensuring language equivalence through translation and back translation, expert reviews and pilot testing to address cultural and linguistic nuances. The validity and reliability of the Turkish version were assessed through a series of statistical analyses. These findings indicated that the adapted questionnaire is a valid and reliable tool for assessing decision-making processes in Turkish-speaking populations. In the second part, the relationship between cognitive flexibility and decision-making abilities was evaluated in a sample of 332 participants. Correlation analysis identified a statistically significant and positive relationship between cognitive flexibility and decision-making ($r = 0.233$, $p < 0.01$), indicating that individuals with greater cognitive flexibility tend to perform slightly better in decision-making tasks. The findings underscore the complexity of cognitive and behavioural interactions, emphasising the importance of exploring other mediating and moderating variables in future research.

1 | Introduction

Decision-making represents one of the fundamental cognitive processes that individuals consistently encounter in their daily lives (Mettas and Norman 2011). Each day, people navigate decisions across diverse domains, ranging from selecting shampoos and stocks to medical treatments and friendships, often for varying reasons (Parker and Fischhoff 2005). Tversky and Kahneman (1983) liken decision-making to speaking, as it is an unconscious activity, prompting extensive exploration of the subject across disciplines such as mathematics, statistics, economics, political science, sociology and psychology. This essential skill, pivotal for an individual's environmental adaptation and autonomy, plays a crucial role in the maintenance of daily life and is generally associated with choosing between two or more options (Morelli et al. 2022). The decision-making process itself is intellectually intricate, requiring the integration of multiple dimensions within a decision context to arrive at a conclusion (Taherdoost and Madanchian 2023). Human existence is replete with complex and heterogeneous decision scenarios (Phillips et al. 2016). Within these contexts, individuals may exhibit either rational or irrational behaviour (Bhui et al. 2021),

influenced by implicit or explicit assumptions shaped by a variety of factors, including physiological, biological, cultural and social conditions (Taherdoost and Madanchian 2023).

Decision-making is closely tied to evaluating alternatives and selecting among them. This process entails activities such as identifying and analysing problems, establishing criteria and formulating potential solutions (Newell et al. 2022). As Zeleny (2011) observed, humans are distinct from machines in their capacity for cognitive, affective and experiential engagement in the decision-making process. Similarly, Lehrer (2019, 15) emphasises that decisions are not merely the outcomes of cognitive processing but are also significantly shaped by emotions and experiences. Furthermore, individuals may feel compelled to make suboptimal choices despite recognising the flawed logic underlying their decisions (Phillips et al. 2016). A recent meta-analysis also indicated a prominent result about two salient decision-making styles that are rational and intuitive styles that, when both are evaluated together, they are correlated with goal pursuit behaviour, which was found to have a triggering role in making better decisions. However, when their interpretation is made separately, the rational decision-making style necessitated effort along with commitment, while the intuitive style progressed with positive emotions (Bavolar et al. 2024). The same study also pointed to another important result regarding people adopting the avoidant decision-making style, that they were drastically close to adopting a goal pursuit behaviour ending with negative outcomes, maladaptive emotions and unsuccessful attempts that were mainly motivated only by extrinsic motivation, let alone intrinsic motivation, which is necessary for better decision-making (Bavolar et al. 2024). Ultimately, numerous factors collectively influence the intricate dynamics of human decision-making.

1.1 | Cognitive Aspects of Decision-Making and Cognitive Flexibility Skills

Decision-making and cognitive flexibility are intricately intertwined, as both are pivotal in navigating complex and dynamic environments. Cognitive flexibility is the ability to adapt cognitive processing strategies to novel and unexpected environmental conditions, emphasising its learnability through experience, the strategic adjustment of problem-solving processes, and the capacity to modify complex behaviours in response to evolving tasks (Canas et al. 2006). Cognitive flexibility, the ability to shift thinking and adapt to changing rules or perspectives, enhances decision-making by enabling individuals to evaluate multiple options and reconsider strategies when faced with novel or conflicting information. This adaptability allows for more nuanced and effective decisions, particularly in uncertain or ambiguous contexts (Laureiro-Martínez and Brusoni 2018). There are various studies investigating the types of decision-making and their correlations with other cognitive executive functions, as in cognitive flexibility. Findings of an earlier study indicated that adolescents demonstrated enhanced cognitive flexibility and decision-making adaptability, driven by heightened sensitivity to negative reward prediction errors (RPEs) and faster learning from negative feedback. In that study, the developmental difference was linked to altered anterior insula activity, emphasising that adolescent decision-making involved more than reward-seeking behaviour and highlights the neural mechanisms supporting flexibility in adapting to changing demands (Hauser et al. 2015). A recent study also highlighted that cognitive flexibility, specifically the process of changing one's mind during decision-making under uncertainty, involved activation of brain regions like the inferior frontal junction, anterior insula, anterior cingulate cortex, and dorsolateral prefrontal cortex, with neural activity patterns predicting decision changes with notable accuracy (Zühlsdorff et al. 2023). Therefore, advances in perceptual decision-making research suggest a connection between cognitive flexibility and decision-making skills, as neurons involved in decision formation also adapt to context-dependent task rules, linking evidence accumulation to flexible control mechanisms (Okazawa and Kiani 2023).

Cognitive flexibility facilitates the integration of diverse information, fostering creative problem-solving and reducing susceptibility to cognitive biases, which can otherwise impair decision-making. A study comparing the performance of participants with low and high levels of cognitive flexibility in terms of their decision-making skills revealed with their ERP results that individuals with higher cognitive flexibility exhibit superior decision-making skills, characterised by faster rule acquisition, stable task performance and greater sensitivity to feedback, reinforcing the critical role of cognitive flexibility in adaptive and advantageous decision-making, and the P300 of the low group was found to be impaired (Dong et al. 2016). As studies indicated, higher cognitive flexibility leads to better and more stable decision-making, and these two skills are inevitably correlated. Ultimately, the synergy between these skills underscores their collective importance in achieving optimal outcomes in a variety of domains.

1.2 | Decision-Making and Cognitive Flexibility Skills in Higher Education

Developing evaluative judgement in higher education is crucial as it enhances students' ability to assess and define quality, connects various pedagogical activities to learning outcomes, and empowers them to transition from dependent novices to self-directed learners capable of navigating academic and professional challenges effectively (Tai et al. 2018). A study conducted with 697 college students examined differences in decision-making attitudes among students based on gender and school years and identified key steps in the decision-making process, including recognising the issue, selecting an optimal solution, listing possible options, gathering necessary information and evaluating each plan systematically, providing insight into how students approach decision-making in practice and revealed significant variations between male and female students as well as between freshmen and seniors (Le et al. 2022). This suggests that targeted interventions or tailored support may be needed to address these differences and enhance decision-making skills. Additionally, systematic steps identified in the decision-making process highlight areas where educators and administrators can provide guidance to improve students' ability to approach problems effectively and make well-informed decisions. A study with 366 students highlighted that helping students structure and analyse information during academic

decision-making could reduce stress and lead to better outcomes (Galotti and Umscheid 2019). It also found that college students, compared to high school students, consider more options and criteria and make decisions more independently, likely due to their greater maturity, experience and commitment to education. These findings suggest that encouraging a more analytical and less intuitive approach to decision-making could further support students in managing complex academic choices effectively.

On the other hand, the variation in decision-making attitudes by gender and academic year, along with the systematic decision-making steps identified, underscores the importance of fostering cognitive flexibility to help students adapt their approaches and make more effective, context-sensitive decisions. A recent study examined differences in cognitive flexibility and critical thinking dispositions among university students based on gender, grade level and faculty, as well as their interrelationship and predictive power by analysing data from 366 students, and the results revealed high levels of both cognitive flexibility and critical thinking, with a significant positive relationship between the two (Karakuş 2024). Cognitive flexibility emerged as a significant predictor of critical thinking dispositions, highlighting their strong interconnection and mutual reinforcement. There are numerous studies pointing to the relationship among cognitive flexibility, decision-making skill, cognitive emotion regulation, managing executive tasks, resilience, self-regulation, self-respect levels of college students (Laureiro-Martínez and Brusoni 2018; Yeşilbursa and Yalın 2021; Güler and Aydın 2022; Skagerlund et al. 2022; Almutairi and Ahmed 2022; Nakhostin-Khayyat et al. 2024). Therefore, understanding the relationship between cognitive skills as in decision-making and cognitive flexibility offers significant contributions to the education of university students, particularly in fostering critical thinking and adaptability. By recognising how cognitive flexibility enhances decision-making, educators can design curricula and learning experiences that encourage students to approach problems from multiple perspectives, adapt to novel challenges, and evaluate alternatives effectively. This relationship underscores the importance of developing metacognitive awareness, enabling students to monitor and regulate their thought processes during decision-making. Such skills are invaluable for navigating the complexities of academic, professional and personal contexts, equipping students with the tools to make informed and adaptive decisions in an ever-evolving world.

In an era characterised by the rapid progression of science and technology, the world is simultaneously undergoing swift development and transformation. Korteling et al. (2023) note that while these advancements have brought about increased prosperity and comfort, they have also introduced various challenges and threats. Consequently, navigating life in such a dynamic environment often necessitates making complex and difficult decisions. In this context, understanding the variables that influence decision-making skills has become crucial for both scientific inquiry and individual development (Sanz de Acedo Lizarraga et al. 2009). This study, therefore, seeks to adapt the Decision-Making Questionnaire—designed to explore the factors influencing decision-making across a broad demographic, including young adults (18–25 years), adults (26–60 years) and older adults (61–75 years)—into the Turkish language as well as seek its association with another cognitive and executive skill, that is cognitive flexibility.

2 | Method

2.1 | Study 1

Sanz de Acedo Lizarraga et al. (2009) developed the Decision-Making Questionnaire with 64 items with good internal consistency. The questionnaire consisted of 10 factors which were titled as uncertainty, time/money pressure, information and goals, cognition, emotion, social pressure, consequences of the decision, motivation, self-regulation and work pressure. The first phase of the study consisted of various sub-phases that included determining the pilot group, adapting the questionnaire by following a comprehensive study schedule for language equivalence, and concluding the process with validity and reliability analysis. The studies pertaining to Study 1 are detailed in the following subtitles.

2.1.1 | Participants and Procedures

Three separate processes were followed in the study. At first, language adaptation of the questionnaire was initiated with language experts in English and Turkish languages. Following a long translation process together with a process for determining the comprehensibility of items, a final version of the questionnaire was presented to a pilot group with the aim of determining its consistency. At the second step, the pilot group to which 22 students studying in the English Translation and Interpreting department participated scored the comprehensibility of the items that were found comprehensible in the analysis. The final stage was completed with 506 young adult and adult female and male participants living in Turkey whose ages ranged between 17 and 64 ($M = 23.24$, SD = 6.93) selected by convenience sampling. Thus, psychometric properties of the questionnaire were determined by using the data obtained from 503 individuals, excluding 3 participants with missing data, who filled out the data set through the form created online. Of the research group, 327 (65%) were female and 176 (35%) were male. In brief, 503 participants, who stated their level of English as being above B2 level were included in the process, whose ages cumulate around 18–27, voluntarily participated in the study and answered 64 questions of the questionnaire.

2.1.2 | Statistical Analysis

The findings regarding the linguistic equivalence, validity and reliability of the Decision-Making questionnaire are reported below.

2.1.2.1 | Pilot Group Analysis. The details with regard to the results collected from the pilot group are detailed in Table 1.

A pilot is mostly advised to be designed in conjunction with a subsequent confirmatory study, which is conducted only if the pilot's results justify proceeding, and the pilot should specifically

TABLE 1 | Descriptive statistics.

	Mean	SD	*n*
English total	450,7727	43,44338	22
Turkish total	439,7727	46,87870	22

serve as a planning tool meeting the needs of the confirmatory study (Duan 2013). Anchoring this perspective, a pilot group was determined with 22 students before proceeding with the main group (Table 2).

To test the linguistic equivalence of the questionnaire, 22 adults were administered first the English and then the Turkish forms of the questionnaire at 3-week intervals. As a result of the correlation analysis, it was found that there was a highly positive and significant relationship between the English and Turkish forms of the questionnaire ($p < 0.01$). The Turkish and English translations of the questionnaire items and linguistic equivalence stages are detailed in the Linguistic Equivalence stage.

2.1.2.2 | Linguistic Equivalence Analysis. Stage 1: questionnaire items were translated into Turkish by translator A, who is an expert in the field as an instructor, and a translator F, who works as a certified translator in a translation office.

Stage 2: The two translated documents of translators A and F were scored by other certified translators N and Z, after which an intraclass correlation analysis was conducted. The intraclass correlation result between the scores was consistent (Table 3).

Stage 3: Obtained a high correlation score for the final form of the translation; each translator's scoring was averaged. Accordingly, N: 4.35, Z: 4.29. It revealed that the translators' ratings (out of 5) are high (Table 4).

Stage 4: Each item was averaged separately. The mean of items is averagely over 4.5 out of 5 as indicated in Table 4. As high averages were obtained for all items, the final version of the items was accepted.

Stage 5: Following the finalisation of the English translation and comprehensibility processes along with determining the consistency between English translators, the Turkish comprehensibility process was initiated. 4 Turkish language experts/teachers scored the comprehensibility of the Turkish translation. The intraclass correlation among 4 Turkish language experts demonstrated that there was an inconsistency between the experts who contributed to the study with their recommendations. The Turkish translation of the questionnaire was updated again by taking the recommendations of the experts into consideration. Thus, an updated version with the recommendations of language experts was attained (Table 5).

Stage 6: After the questionnaire was revised in line with the recommendations of Turkish language experts, the updated version was re-scored by 2 more experts. The expert evaluations in the final form of the questionnaire were found to be highly compatible (0.879) and the new form of the questionnaire was accepted as the final version (Table 6).

Stage 7: The comprehensibility of all items was assessed. A pilot group of 31 participants, representing the population and as heterogeneous as possible in terms of biopsychosociodemographic characteristics, rated the Turkish comprehensibility of the questionnaire items on a scale of 1 (not comprehensible at all) to 5 (completely comprehensible). In the analysis phase, firstly, the average of the ratings of the participants in the pilot sample was calculated for each item separately, and then the averages of these averages were calculated to find the overall comprehensibility average. According to the results of the analysis, all items were found to be comprehensible (4.66 out of 5).

Stage 8: The back translation process, which is the very last step in the language adaptation process for comparing the original material with the back translated version, was initiated for the questionnaire after attaining the exact comprehensibility. A certified translator who had a command of the original language of the questionnaire at an advanced level, a different one from the translators in the Turkish translation stage, performed back translation. The similarity between the original questionnaire items and the back translated material was assessed by one

TABLE 2 | Correlations.

	English total	Turkish total	*n*
English total			
p	1	0.541**	22
r		0.009	
Turkish total			
p	0.541**	1	22
r	0.009		

Note: ** denotes statistical significance at the level of $p < 0.01$.

TABLE 4 | Translator's ratings.

Translator	Mean of items
N	4,359375
Z	4,296875

TABLE 3 | Intraclass correlation coefficient.

		95% confidence interval		*F* test			
	Intraclass correlation[b]	Lower bound	Upper bound	Value	df1	df2	Sig
Single measures	0.860[a]	0.780	0.912	13,211	63	63	0.000
Average measures	0.925[c]	0.876	0.954	13,211	63	63	0.000

[a]Single measures indicate the reliability of a single evaluator.
[b]"intraclass correlation", calculated using a two-way mixed-effects model, consistency type, assessing the degree of agreement among raters.
[c]Average measures indicate the reliability of the average rating of all evaluators.

TABLE 5 | Intraclass correlation coefficient.

		95% confidence interval		*F* test			
	Intraclass correlation[b]	Lower bound	Upper bound	Value	df1	df2	Sig
Single measures	−0.167[a]	−0.378	0.068	0.691	63	63	0.927
Average measures	−0.402[c]	−1.215	0.126	0.691	63	63	0.927

[a]Single measures indicate the reliability of a single evaluator.
[b]"intraclass correlation", calculated using a two-way mixed-effects model, consistency type, assessing the degree of agreement among raters.
[c]Average measures indicate the reliability of the average rating of all evaluators.

TABLE 6 | Intraclass correlation coefficient.

		95% confidence interval		*F* test			
	Intraclass correlation[a]	Lower bound	Upper bound	Value	df1	df2	Sig
Single measures	0.510[a]	0.306	0.670	3109	63	63	0.000
Average measures	0.676[a]	0.469	0.802	3109	63	63	0.000

[a]Single measures indicate the reliability of a single evaluator.
[b]"intraclass correlation", calculated using a two-way mixed-effects model, consistency type, assessing the degree of agreement among raters.
[c]Average measures indicate the reliability of the average rating of all evaluators.

other certified translator, at the end of which they were found correlated.

In brief, in order to conduct the adaptation study of the Decision-Making Questionnaire, a permission was first obtained from the authors who developed the questionnaire. The English form of the questionnaire was translated into Turkish by two translators who had an advanced level of English and are native speakers of the Turkish language. The translated version of the questionnaire was reduced to a single form, and the final Turkish version was scored by 2 translators in terms of their comprehensibility. After collecting a 4.5 score out of 5 for the consistency, the next step, which regarded the Turkish comprehensibility, was taken. 4 specialists in Turkish Education scored the items in terms of their comprehensibility in Turkish. The final version of the questionnaire, which was revised according to the recommendations collected with regard to the Turkish language comprehensibility of the questionnaire, was evaluated by 8 experts in total, 4 experts in English and 4 experts in Turkish. As the consistency between Turkish experts was not attained, 2 additional Turkish language experts were added to the process for evaluating the comprehensibility of the translated material, which was updated with the recommendation of 4 Turkish language experts. The comprehensibility was finally reached at a high level. In order to evaluate the comprehensibility of the questionnaire from the perspectives of individuals, an adult group consisting of 31 participants was asked to score the comprehensibility, at the end of which it was determined that the questionnaire was comprehensible. At the final stage, a back translation process was conducted by a certified translator of English. The similarity between the original questionnaire and the back translation version of the questionnaire was matched and given a score in terms of their consistencies by another certified translator. Thus, the final version of the questionnaire was obtained following the back translation process. In the language adaptation process, 12 language experts in total were asked to provide support, at the end of which a comprehensible translation was attained.

Following the language equivalence process, a confirmatory factor analysis process was initiated to examine the construct validity and similar questionnaire validity of the questionnaire. The data of the study for confirming the validity were analysed with SPSS 24.0 software and AMOS 24.0.

2.1.2.3 | Reliability Analysis. Cronbach's alpha coefficient was analysed for the reliability of the Decision-Making Questionnaire. Cronbach's alpha coefficient was calculated as 0.96.

2.1.2.4 | Validity Analysis

2.1.2.4.1 | Confirmatory Factor Analysis (CFA). For confirming the construct validity of the questionnaire, a confirmatory factor analysis (CFA) process was initiated by using the factors of the original questionnaire, which included 10 sub-factors and 3 main factors that are titled as Task, Subject and Context. For the "Task" main factor, uncertainty, time/money pressure and information and goals sub-factors; for the "Subject" main factor, motivation, self-regulation, cognition and emotion sub-factors; and for the "Context" main factor, social pressure and work pressure sub-factors were planned, which constituted 64 items in total. In the CFA analysis process, as the factor loads were found to be significant with regard to the model–data fit indicators, no modification was necessitated for the items (Hu and Bentler 1999; Kline 2005). The model–data fit indicators indicated that $X^2/SD = 27.00/69 = CFI\ 0.99 \geq 0.95$, $TLI = 0.93$, $RMSEA = 0.12$ (Figure 1).

The Table 7 indicated a good fit value of indicators. Additionally, as the analysis had a good fit value and the df is 67 along with a strengthened SRMR with the value 0.048, the model was

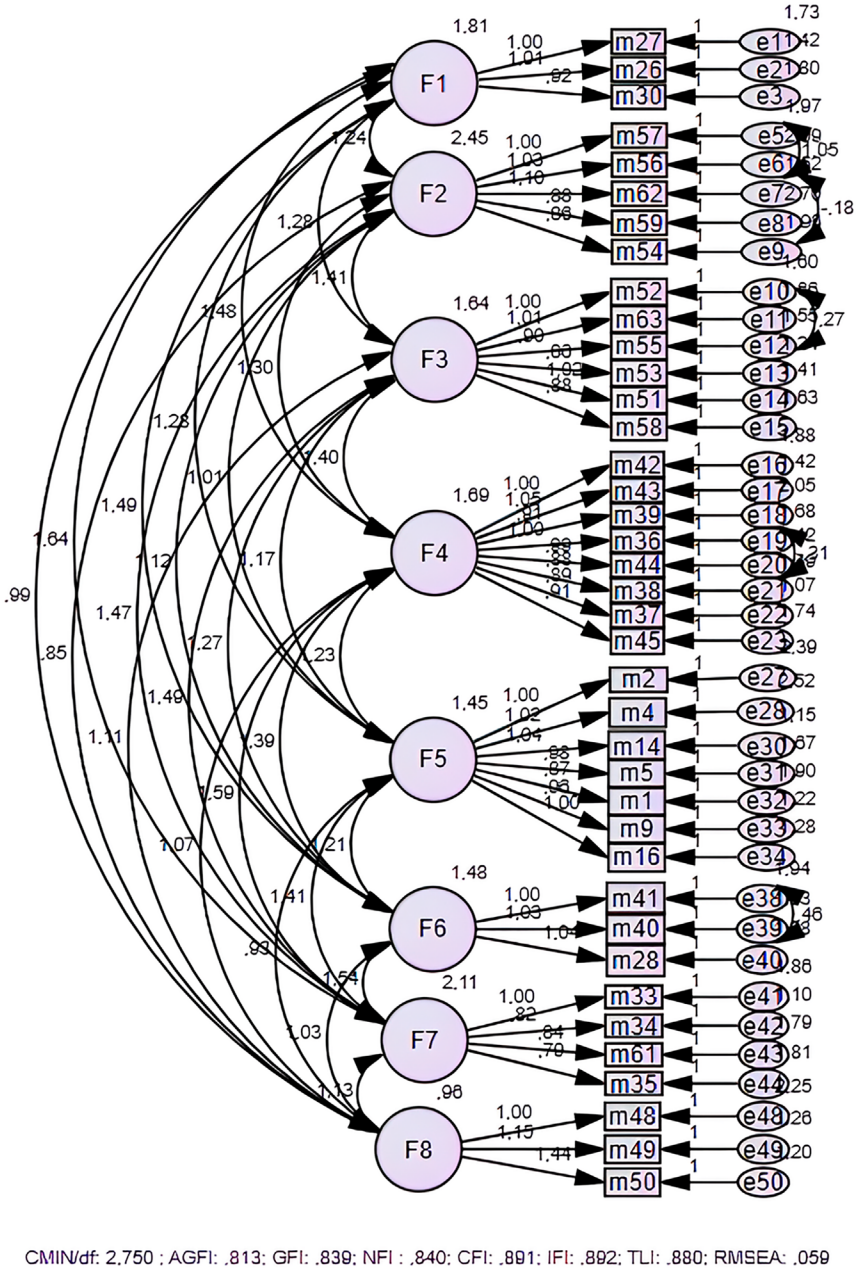

FIGURE 1 | Indicates the CFA standard coefficients of the Decision-Making Questionnaire.

TABLE 7 | Model fit indices.

X^2	df	X/df^2	RMSEA	CCFI	NFI	TLI	IFI	RFI	SRMR
184,78	67	2.75	0.05	0.89	0.84	0.88	0.89	0.82	0.048

accepted as being suitable with these results (Kenny et al. 2015). Thus, the model was accepted based on CFI and SRMR.

2.2 | Study 2

Decision-Making Questionnaire was accepted as a valid and reliable questionnaire with good fit value following the confirmatory and reliability analysis. Having re-affirmed the satisfactory internal consistency, a correlational study was initiated based on the findings of the original article in which the questionnaire was developed. Sanz de Acedo Lizarraga et al. (2009) found that decision-making processes were shaped by various factors across different age groups, with men tending to prioritise information seeking and analysis, whereas women placed greater importance on time and financial resources. Additionally, when the decision-making skill is evaluated from the cognitive perspective, recent research points to the fact that cognitive flexibility

skill of the individuals might be correlated with decision-making skill (Hauser et al. 2015; Laureiro-Martínez and Brusoni 2018; Okazawa and Kiani 2023; Zühlsdorff et al. 2023).

To test the results of the original article and affirm the findings of existing literature with regard to the cognitive aspect of decision making, we proposed the adapted questions to 332 students studying at university along with the Cognitive Flexibility Scale which was developed by Martin and Rubin (1995), a one factor scale consisting of 12 questions, internal consistency of which is 0.74 and its Cronbach alpha coefficient is 0.77. Cognitive flexibility, the ability to engage in two or more cognitive processes simultaneously, is an important executive function of human cognition (Magnusson and Brim 2014). This ability can be associated with complex cognitive functions which can decrease with ageing and is highly associated with the use of strategies from the cognitive perspective (Miyake et al. 2000). Thus, the findings of Study 2 questioned the relationship between cognitive flexibility and decision-making skill (Table 8).

The descriptive statistics indicated that the sample size consisted of 332 participants ($F=206$, $M=126$). The year of birth ranged from 1962 to 2007, with a mean birth year of 1999.48 (SD = 7.789). For Cognitive Flexibility, scores ranged from 12.00 to 72.00, with a mean of 50.06 (SD = 7.25). For Decision-Making, scores varied from 63.00 to 351.00, with a mean of 278.48 (SD = 49.11). These findings provide a detailed overview of the demographic and key variable distributions in the dataset, offering insights into the range and variability of the measured constructs (Table 9).

The findings in the table indicated that for the variable Cognitive Flexibility total score, Levene's test showed a significant difference in variances ($F=11.598$, $p=0.001$), so the t-test without assuming equal variances was considered ($t=0.664$, df = 204.544, $p=0.508$), revealing no statistically significant difference between groups. Similarly, for Decision-Making total score, Levene's test showed marginally significant variances ($F=5.058$, $p=0.025$), and the *t*-test assuming equal variances ($t=1.591$, df = 330, $p=0.112$) also indicated no statistically significant group differences. In both cases, the 95% confidence intervals of the mean differences included zero, further supporting the lack of significant effects. These results suggest no meaningful differences in the cognitive and decision-related measures between the compared groups (Table 10).

The correlation analysis revealed a statistically significant, positive, but weak relationship between Cognitive Flexibility and Decision-Making ($r=0.233$, $p<0.01$). This indicates that higher scores on cognitive measures (Cognitive Flexibility) are modestly associated with higher scores on decision-related measures (Decision-Making). The findings are based on a sample size of 332, and the significance level suggests the relationship is unlikely to occur by chance. These results highlight a meaningful, though limited, connection between cognitive and decision-making processes in the studied sample.

3 | Discussion

Life involves countless decisions, but human decision-making is not a uniform or simple process. For example, even intelligent individuals can make choices that others consider wrong, rash or risky (Phillips et al. 2016). The DMQ, which was adapted into Turkish with this study, is a psychometric instrument that aims to comprehensively measure individual, task and contextual factors that affect decision-making processes. It has the potential to examine differences in decision-making processes according to age, gender and other demographic characteristics of individuals. It has been emphasised that the questionnaire can provide guidance in vocational choices and career planning processes of young people. The DMQ was designed to consist of 10 sub-factors and 3 main factors based on the decision-making literature. Sub-factors such as uncertainty, financial pressure and emotional processes were structured to better understand the complexity of decision-making processes. In this context, the fact that the questionnaire has been validated through

TABLE 8 | Descriptive statistics.

Variable	*n*	Min.	Max.	Mean	SD
Birth year	332	1962	2007	1999	7789
Cognitive flexibility	332	12.00	72.00	50.06	7.25
Decision-making	332	63.00	351.00	278.4	49.1

TABLE 10 | Correlation analysis between cognitive flexibility and decision-making skills.

Variable	Cognitive flexibility	Decision-making	*N*	Sig. (2-tailed)
Cognitive flexibility	1.000	0.233**	332	0.000
Decision-making	0.233**	1.000	332	0.000

Note: ** denotes statistical significance at the level of $p<0.01$.

TABLE 9 | Independent samples *t*-test results.

Variable	Levene's test (*F*)	Sig.	*t*	df	Sig. (2-tailed)	Mean difference	95% CI of the difference (lower, upper)
Cognitive flexibility total score	11.598	0.001	0.716	330	0.474	0.58800	(−1.02644, 2.20243)
Decision-making total score	5.058	0.025	1.591	330	0.112	8.81731	(−2.08267, 19.71728)

confirmatory analyses makes an important contribution to the literature by making it possible to examine decision-making processes in more depth. At the same time, the adaptation of this questionnaire into Turkish was aimed to provide a deeper understanding of decision-making processes in the Turkish cultural context and increase its applicability in areas such as education, psychology and psychological counselling. This approach constitutes a meaningful reference to compare the accuracy of the theoretical frameworks of the questionnaire and scale used in our study and to discuss the robustness of the developed methods. Sanz de Acedo Lizarraga et al. (2009) emphasised in DMQ that research on decision-making processes highlights the age factor that can be a determinant in these processes. Dror et al. (1998) and Finucane et al. (2000) also stated that there are significant differences between age groups and that these differences may be due to factors such as social variables, cognitive skills and health status, but Chen et al. (2023) and Moshman (1993) argued that older individuals can compensate for these differences by using strategic compensation mechanisms. Sanz de Acedo Lizarraga et al. (2009) aimed to provide a more comprehensive perspective on the decision-making processes of age groups in DMQ.

The findings of this study provided evidence for a statistically significant, albeit weak, positive relationship between cognitive flexibility and decision-making abilities. This suggests that individuals with greater cognitive flexibility may demonstrate a modest advantage in decision-making processes. The significant correlation aligns with previous literature emphasising the role of cognitive flexibility in facilitating effective decision-making (Hauser et al. 2015; Dong et al. 2016; Okazawa and Kiani 2023; Zühlsdorff et al. 2023). However, the strength of the relationship is limited, indicating that other factors, such as emotional regulation, experience or situational variables, may also play critical roles in decision-making outcomes. For instance, a study by Yildiz and Eldeleklioglu (2021) revealed that cognitive flexibility and happiness significantly contribute to effective decision-making, whereas intolerance of uncertainty negatively impacts these processes. The study by Skagerlund et al. (2022) examined the relationship between individuals' decision-making competence and their cognitive abilities. The findings highlighted those executive functions—such as working memory, cognitive flexibility and inhibitory control—play a critical role in decision-making processes. Additionally, numerical abilities and general intelligence were identified as key factors supporting conscious and rational decision-making. The study emphasised the importance of enhancing executive functions to improve decision-making skills effectively. In Frey et al.'s (2015) study, they examined the role of cognitive flexibility in decision-making processes, particularly in relation to the size of the choice set and how this varies across age groups. The study demonstrated that cognitive flexibility had a significant impact on decision-making abilities that change with age, highlighting the need for tailored interventions for older adults in complex decision-making situations.

This study provides a comprehensive analysis of cognitive flexibility and decision-making, revealing a modest but meaningful positive relationship between these constructs, indicating that individuals with higher cognitive flexibility may exhibit better decision-making tendencies. However, no significant differences were found between groups in either cognitive flexibility or decision-making scores, suggesting a consistent pattern across the sample. These findings highlight the interplay between cognitive and decision-making processes while emphasising the stability of these traits across demographic variables within the studied population. Results of this study underscore the complexity of cognitive and behavioural interactions, highlighting the need for further research to explore additional mediating and moderating factors that influence this relationship. Despite its limitations, this study contributes to understanding the interplay between cognitive flexibility and decision-making, offering potential implications for interventions aimed at enhancing decision-making through cognitive skill development.

4 | Conclusion

Decision-Making Questionnaire is significant for identifying the factors that influence the decision-making processes of individuals aged 17–64 and for assessing the cognitive, emotional and social aspects of decision-making. In the confirmatory factor analysis of the questionnaire with 64 items, all fit indices were at satisfactory levels, and the 10-factor model with 3 main subcategories that are Task, Subject and Context was validated. The analysis produced comparable outcomes for both men and women in a wide range of ages. The questionnaire demonstrated strong reliability with Cronbach's alpha. In summary, the questionnaire confirmed the 10-factor structure, ensured measurement consistency and re-affirmed its reliable results. Additionally, this study highlights a modest yet statistically significant relationship between cognitive flexibility and decision-making abilities for university students, underscoring the interconnected nature of cognitive and behavioural processes. Although the positive correlation suggests that individuals with higher cognitive flexibility may exhibit better decision-making skills, the weak strength of this relationship indicates that decision-making is influenced by a broader set of factors. These findings contribute to the growing body of research on cognitive processes and provide a foundation for future studies to explore additional variables that impact decision-making. Practical implications include the potential for cognitive training programmes to enhance decision-making abilities, particularly in contexts where adaptability and flexible thinking are critical.

Ethics Statement

The Ethics Committee of Rectorate in Istanbul Nisantasi University in Turkiye approved this study with 2023/39 meeting date. The participants voluntarily attended and filled out the previously prepared consent form and were informed with regard to the processes in the study.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

All data, analysis code and research materials are available at https://osf.io/59cvw/?view_only=cbf02158d1e146ecb52c2767eec3d16f.

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