

# Decision-Making Skills: An Assessment among Adolescents in Surat City

Rutu Sanjaybhai Buch, Mohua Moitra, Rahul Damor, Naresh Chauhan

Department of Community Medicine, Government Medical College, Surat, Gujarat, India

## Abstract

**Introduction:** This study assessed the process of decision-making among adolescents and the factors affecting it and also explored the styles of decision-making among adolescents. **Methodology:** A cross-sectional study using purposive sampling was carried out involving 1177 college-going students aged between 17 and 19 years. General Decision-Making Style (GDMS) and semi-structured questionnaire was used to collect data. Data were analyzed with the help of SPSS and AMOS. Exploratory and confirmatory factor analyses were run. **Results:** Good decision-making process was seen among 76.9% of the students. Kaiser–Meyer–Olkin verified that sampling adequacy was 0.8. Scree plot and Monte Carlo parallel analysis were suggestive of four factors which were logically intuitive, avoidant, dependent, and spontaneous styles of making decisions. Cronbach's alpha was 0.7 for GDMS. Staying arrangement, paternal education, fantasy scale score, perspective-taking score, personal distress score, problem-solving, self-esteem, creative thinking, and coping with stress were found statistically significant with decision-making process. While, on confirmatory factor analysis, a five-factor model was found to be fit with minimum discrepancy/degrees of freedom value of 2.68, root mean square error of approximation: 0.038, Comparative Fit Index (CFI): 0.927, Normed Fit Index (NFI): 0.890, parsimony CFI: 0.66, and parsimony NFI: 0.634. A high correlation was observed between rational and intuitive styles. **Conclusion:** The process of decision-making was found to be good, but styles of making decisions were overlapping

**Keywords:** Adolescent, decision-making, factor analysis, General Decision-Making Style, life skills

## INTRODUCTION

Adolescence is the period of transition between childhood and adulthood.<sup>[1]</sup> These are also years of experimentation and risk taking, of giving in to negative peer pressure. Adolescence is a period of increased potential but also one with a greater vulnerability and newer responsibilities.<sup>[2]</sup>

Adolescents are unique in the way they understand information and how they think about the future and make decisions in the present.<sup>[2,3-8]</sup> Life Skills Education is a novel promotional program that teaches generic life skills through participatory learning methods of games, debates, role plays, and group discussion which would help the adolescents.<sup>[9-11]</sup>

This study was carried out with the objectives to assess the process of decision-making among adolescents and the factors affecting it and to explore the styles of decision-making among adolescents. It is a part of assessment of the ten different life skills.

## METHODOLOGY

A cross-sectional study was conducted between March 2015 and September 2015. The ethical clearance was taken from the Institutional Ethics Committee. Six colleges from different specialties were purposively selected, and the 1<sup>st</sup>-year students aged between 17 and 19 years were the participants.

Students present in the briefing session were included after getting written consent. The participants filled a self-administered questionnaire, and the researcher led them to ensure clarity of understanding the questions. Sociodemographic characteristics and decision-making process (seven items where scores ranged from 5 to 35) were

**Address for correspondence:** Dr. Mohua Moitra,  
Department of Community Medicine, Government Medical College,  
Vadodara, Gujarat, India.  
E-mail: mohuamoitra27@gmail.com

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assessed with the help of a predesigned questionnaire which was a part of the self-administered questionnaire. Data were analyzed using Statistical Package for Social Sciences with AMOS module (SPSS for Windows, version 18.0, SPSS Inc, Chicago, Illinois, USA). Exploratory and confirmatory factor analyses were run.

**Study tool**

General Decision-Making Style (GDMS) Inventory has 25 questions rated on a five-point Likert scale. The GDMS is an appropriate, reliable, and valid scale for assessing decision-making and decision-making quality.<sup>[12-16]</sup> GDMS questionnaire elicits decision-making styles in five different patterns which are intuitive, rational, dependent, avoidant, and spontaneous.

**RESULTS**

A total of 1177 college students were interviewed from 6 different colleges. Among them, 38.2% were male and 61.8% were female; 88.7% had an urban and 11.3% had a rural background for their schooling. Most (92.2%) of the participants had studied under the Gujarat State Education Board followed by Central Board of Secondary Education (5.8%); 85.2% of the participants reported to be staying with their parents, hostel (11%), and in their relative’s house (3.4%). There was no significant difference among these variables.

In this study, 91.8% of the participants followed Hinduism, Islam (4.6%), Jainism (2%), Christianity (0.7%), and others (0.9%). Most (50.2%) of the participants belonged to the general category, followed by SEBC/OBC (36.2%), ST (8.3%), and SC (5.3%). The mean monthly family income was Rs. 33,691 with a standard deviation (SD) of 74451. A total of 27.1% of the participants belonged to class 1 of modified Prasad’s classification followed by 23.2% in class 2, 17.8% in class 3, 16% in class 4, and 5.9% in class 5.

**Decision-making process**

Good decision-making skill was elicited among 76.9% of the participants and 23.1% showed to have fair scores. The mean, SD, and median of decision-making process were 26.9, 3.6, and 28, respectively.

Decision-making was observed to be significantly better ( $P < 0.05$ ) if the participants were staying with their parents, had a more educated father or if they themselves were pursuing a professional degree. It was significantly better in participants who had higher scores in perspective taking ( $P = 0.000$ ), Interpersonal Reactivity Index ( $P = 0.001$ ), problem-solving ( $P = 0.000$ ), self-esteem ( $P = 0.000$ ), creative thinking ( $P = 0.000$ ), and coping with stress ( $P = 0.000$ ).

Backward logistic regression (LR) was used to study the determinants of decision-making process among adolescents. Wald statistics was significant for this model (Wald: 258.39,  $df = 1$ ,  $P = 0.000$ ). Result showed an overall model giving 77.1% correct predictions. The Chi-square value is 103.69 and

the associated significance level is  $< 0.05$ , so the present model shows decreased deviance from the base model. Hence, this model is a better fit compared to the base model. Nagelkerke  $R^2$  value is 0.143 which indicates that 14% of the variance in the outcome (dependent) variable which is decision-making process is explained by this model where independent predictors were critical thinking, problem-solving, and creative thinking skills. Hosmer and Lemeshow test had a Chi-square value of 3.92 with 5 degrees of freedom (DF) and  $P = 0.561$  which is also suggestive of a fit model [Table 1].

**Decision-making styles**

Decision-making style of the participants was assessed by the GDMS. The mean, SD, and median for intuitive style were 18.81, 3.1, and 20; dependent style 19.5, 3.4, and 20; rational 19.9, 3, and 20; avoidant style 12.4, 4.2, and 12; and spontaneous style 14.8, 3.7, and 15, respectively. Cronbach’s alpha was 0.701 which suggests that it is acceptable. Results demonstrated a strong agreement to the intuitive and dependent type of decision-making which was backed up by rational thought processes such as double checking of the facts (86%), careful thought (91%), and goal-oriented perspective (80%). The avoidant and spontaneous processes for decision-making were disagreed on by nearly 45% of the participants in most of the variables.

**Results of exploratory factor analysis**

A principal component analysis with oblique rotation was run in SPSS version 19. The Kaiser–Meyer Olkin (KMO) = 0.781 (good according to Hutcheson and Sofroniou, 1999), all KMO values for individual items were  $> 0.7$ . An initial analysis was run to obtain eigenvalues for each factor in the data. Six factors had eigenvalue  $> 1$  and in combination explained 45% of the variance. Monte Carlo parallel analysis was run to extract factors which justified four factors. The total variance explained by four-factor model was 37.1%. The scree plot was also conclusive and showed inflexions that would justify retaining the four factors [Figure 1]. These four factors were retained because of the large sample size and convergence of scree plot and Monte Carlo parallel analysis on this value. The items that cluster on the same factor suggest that factor 1 represents a logically intuitive style of making decisions, factor 2 represents avoidant style, factor 3 represents dependent style, and factor 4 represents the spontaneous style of making decisions [Tables 2 and 3].

**Table 1: Determinants of decision-making process among study participant using logistic regression**

Variables in model	B	SE	Wald	Exp (B)	P	95% CI	
						Lower	Upper
Critical thinking	-1.059	0.168	39.601	0.347	0.000	0.249	0.482
Problem-solving	-0.650	0.161	16.236	0.522	0.000	0.380	0.712
Creative thinking	-0.845	0.175	23.177	0.430	0.000	0.305	0.606
Constant	2.045	0.132	239.716	7.732	0.000		

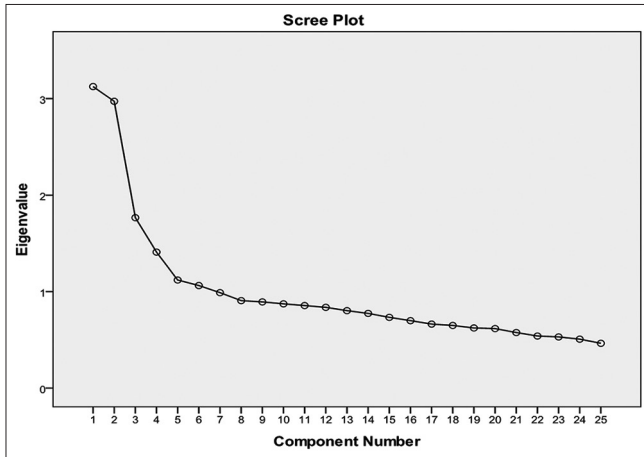
Wald=258.39,  $df=1$ ,  $P=0.000$ .  $\chi^2=93.284$ ,  $df=3$ ,  $P=0.000$ . Nagelkerke,  $R^2=0.14$ . Hosmer and Lemeshow test- $\chi^2=3.923$ ,  $df=5$ ,  $P=0.561$ .  
SE: Standard error, CI: Confidence interval

**Results of confirmatory factor analysis**

*Hypothesis General Decision-Making Style questionnaire model is a five-factor structure*

The model to be tested in hypothesis postulates *a priori* that GDMS questionnaire is a five-factor structure composed of intuitive, rational, dependent avoidant, and spontaneous styles of decision-making.

- The five factors are intercorrelated, as indicated by the two-headed arrows



**Figure 1:** Scree plot for General Decision-Making Style Inventory – exploratory factor analysis

- There are 17 observed variables, as indicated by the 17
- The observed variables load on the factors in the following pattern:
- Intuitive style consists of d\_intuition, d\_innere\_feeling, and d\_instinct; dependent style consists of d\_advise, d\_steer, d\_assistance, and d\_support; rational style consists of d\_double\_check, d\_logical, and d\_options; avoidant style consists of d\_putoff\_uneasy, d\_avoid, d\_postpone, and d\_put\_off; and spontaneous style consists of d\_spur, d\_quick, and d\_snap
- Each observed variable loads on one and only one factor
- Errors of measurement associated with each observed variable (err01–err17) are uncorrelated.

**Model fit summary**

*Minimum discrepancy*

Focusing on the first set of fit statistics, we see the labels number of parameters, minimum discrepancy (CMIN), DF, probability value (P), and CMIN/DF. The value of 292.106 under CMIN represents the discrepancy between the unrestricted sample covariance matrix S and the restricted covariance matrix  $\Sigma(\theta)$  and, in essence, represents the likelihood-ratio test statistic, most commonly expressed as a Chi-square statistic. The test of H0 that GDMS is a five-factor structure, as depicted in Figure 2, yielded a  $\chi^2 = 292.106$ , with 109 DF and a probability of less than 0.01 ( $P < 0.01$ ), thereby suggesting that the fit of the data to the hypothesized model is not entirely adequate.

**Table 2: Pattern matrix of factor analysis with General Decision-Making Style questionnaire**

Question	Fac 1	Fac 2	Fac 3	Fac 4
I make decisions in a logical and systematic way	0.608			
When I make decisions, I tend to rely on my intuition	0.531			
When making a decision, I consider various options in terms of a specified goal	0.531			
When making a decision, I trust my inner feelings and reactions	0.520			
I double-check my information sources to be sure I have the right facts before making decisions	0.478			
When making decisions, I rely on my instincts	0.476			
I generally make decisions that feel right to me	0.474			
I usually have a rational basis for making decisions	0.432			
When making decisions I do what seems natural at that moment	0.409			
I postpone decision-making whenever possible		0.749		
I often put off making important decisions		0.711		
I avoid making important decisions until the pressure is on		0.676		
I put off making decisions because thinking about them makes me uneasy		0.661		
I generally make important decisions at the last minute		0.430		
I often need the assistance of other people when making important decisions			0.756	
If I have the support of others, it is easier for me to make important decisions			0.735	
I like to have someone steer me in the right direction when I am faced with important decisions			0.639	
I use the advice of other people in making my important decisions			0.591	
I make quick decisions				0.678
I generally make snap decisions				0.669
I often make decisions on the spur of the moment				0.651
I often make impulsive decisions				0.455
Eigenvalues	3.13	2.97	1.77	1.41
Total variance explained by model - 37.1%	12.5	11.9	7.07	5.64
Cronbach's $\alpha$	0.64	0.71	0.64	0.64
Cronbach's $\alpha$ of standardized items	0.65	0.70	0.65	0.64

**Table 3: Structure matrix for factor analysis of General Decision-Making Style questionnaire**

Question	Fac 1	Fac 2	Fac 3	Fac 4
I make decisions in a logical and systematic way	0.560			
When I make decisions, I tend to rely on my intuition	0.532			
When making a decision, I consider various options in terms of a specified goal	0.522			
When making a decision, I trust my inner feelings and reactions	0.515			
I double-check my information sources to be sure I have the right facts before making decisions	0.509			
When making decisions, I rely on my instincts	0.476			
I generally make decisions that feel right to me	0.443			
I usually have a rational basis for making decisions	0.442			
When making decisions I do what seems natural at that moment	0.421			
I postpone decision-making whenever possible		0.753		
I often put off making important decisions		0.713		
I avoid making important decisions until the pressure is on		0.679		
I put off making decisions because thinking about them makes me uneasy		0.665		
I generally make important decisions at the last minute		0.595		
I often need the assistance of other people when making important decisions			0.737	
If I have the support of others, it is easier for me to make important decisions			0.731	
I like to have someone steer me in the right direction when I am faced with important decisions			0.658	
I use the advice of other people in making my important decisions			0.595	
I make quick decisions				0.691
I generally make snap decisions				0.679
I often make decisions on the spur of the moment				0.675
I often make impulsive decisions				0.611

\*Fac: Factor

However, both the sensitivity of the likelihood-ratio test to sample size and its basis on the central Chi-square distribution, which assumes that the model fits perfectly in the population (i.e., that H0 is correct), have led to problems of fit that are now widely known. Because the Chi-square statistic equals  $(N - 1) F_{min}$ , this value tends to be substantial when the model does not hold and when the sample size is large. Yet, the analysis of covariance structures is grounded in large sample theory.

Thus, findings of well-fitting hypothesized models, where the Chi-square value approximates the DF, have proven to be unrealistic in most structural equation modeling empirical research. More common are findings of a large Chi-square relative to DF, thereby indicating a need to modify the model in order to better fit the data. Thus, results related to the test of hypothesized model are not unexpected. Indeed, given this problematic aspect of the likelihood-ratio test, and the fact that postulated models (no matter how good) can only ever fit real-world data approximately and never exactly.

One of the first fit statistics to address this problem was the Chi-square/DF ratio, which appears as CMIN/DF is 2.68 (standard recommended value is  $\leq 5$ ) [Table 4].

**Baseline comparisons**

The next set of goodness-of-fit statistics (baseline comparisons), which can be classified as incremental or comparative indices of fit.

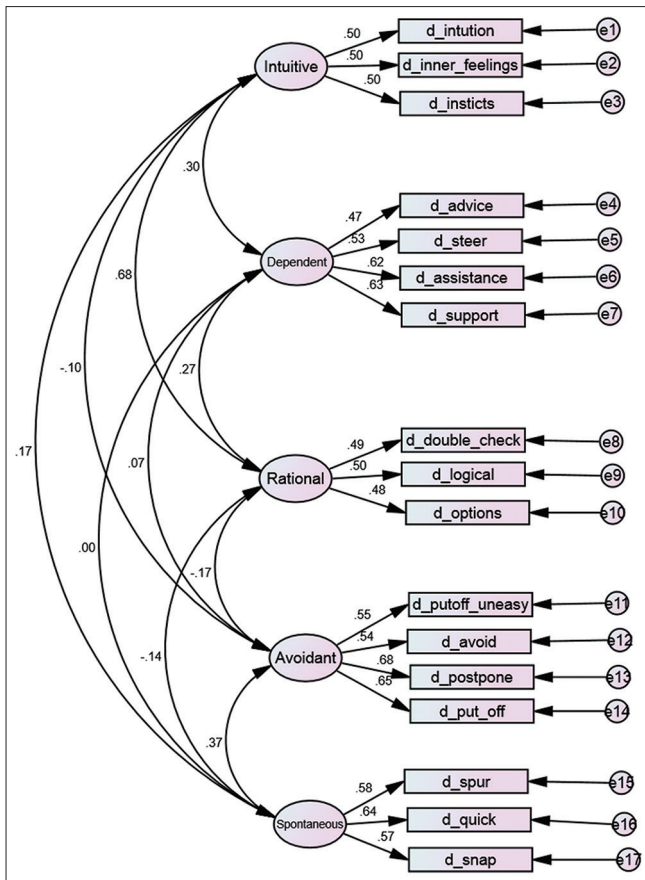
However, addressing the evidence that the Normed Fit Index (NFI) has shown a tendency to underestimate fit in small

samples, Bentler (1990) revised the NFI to take sample size into account and proposed the Comparative Fit Index (CFI). Values for both the NFI and CFI range from 0 to 1.00 and are derived from the comparison of a hypothesized model with the independence (or null) model. As such, each provides a measure of complete covariation in the data. Although a value  $>0.90$  is considered representative of a well-fitting model. In this case, the value is 0.927 indicating the moderate fit of the model [Table 5].

The Relative Fit Index represents a derivative of the NFI; as with both the NFI and CFI, the RFI coefficient values range from 0 to 1.00, with values close to 0.95 indicating superior fit (Hu and Bentler, 1999). In this case, the value is 0.846 indicating the moderate of the model [Table 5].

**Root mean square error of approximation**

The next set of fit statistics focuses on the root mean square error of approximation (RMSEA). Although this index, and the conceptual framework within which it is embedded, was first proposed by Steiger and Lind in 1980, it has only recently been recognized as one of the most informative criteria in covariance structure modeling. The RMSEA takes into account the error of approximation in the population and asks the question “ How well would the model, with unknown but optimally chosen parameter values, fit the population covariance matrix if it were available?”. This discrepancy, as measured by the RMSEA, is expressed per DF, thus making it sensitive to the number of estimated parameters in the model (i.e., the complexity of the model); values  $<0.05$  indicate good fit, and values as high as 0.08 represent reasonable errors of approximation in



**Figure 2:** Estimated five-factor model of General Decision-Making Style (standardized estimate)

**Table 4: Minimum discrepancy**

Model	NPAR	CMIN	df	P	CMIN/df
Default model	61	292.106	109	0.000	2.680

NPAR: Number of parameter, CMIN: Minimum discrepancy, DF: Degrees of freedom

the population have recently elaborated on these cutpoints and noted that RMSEA values ranging from 0.08 to 0.10 indicate mediocre fit, and those >0.10 indicate poor fit. Have suggested a value of 0.06 to be indicative of good fit between the hypothesized model and the observed data, they cautioned that, when the sample size is small, the RMSEA (and Tucker–Lewis Index) tend to over reject true population models. In this case, the value of RMSEA is 0.038 which indicates good fit of model [Table 6].

Table 7 shows the standardized regression weights. The value above 0.7 indicates that a reasonable amount of variance can be extracted from the variable. Majority of the regression weights are >0.5.

## DISCUSSION

Cronbach’s alpha was 0.701 which suggests that it is acceptable.<sup>[17]</sup> Decision-making was affected according to

the staying arrangement, paternal education, or pursuing a professional degree. Decision-making was significantly better in participants who had higher scores in perspective taking ( $P = 0.000$ ), Interpersonal Reactivity Index ( $P = 0.001$ ), problem-solving ( $P = 0.000$ ), self-esteem ( $P = 0.000$ ), creative thinking ( $P = 0.000$ ), and coping with stress ( $P = 0.000$ ). Empathic concern and personal distress scores had no association with decision-making skills. Backward LR suggested that the decision-making process is influenced by multiple factors such as perspective taking, problem-solving, and creative thinking. Thus, although 77% of the participants had good decision-making skills, we have to keep in mind that 23% had fair decision-making skills. Hence, this group should be targeted for this skill development.

Jozef Bovol’ar *et al.* conducted an exploratory factor analysis to assess the inner structure of the measure. The principal axis factoring method with direct oblimin rotation found five factors with an eigenvalue over 1 explaining 48.59% of the shared variance.<sup>[14]</sup> Results of this study had four factors. Indian cultural context and different age groups might be reasons behind this difference.

Results of the current study support the results obtained by Loo.<sup>[18]</sup> Applying the GDMS in cross-cultural settings, a four-factor model was derived with exploratory factor analysis with high correlation between intuitive and rational styles of decision-making.

Confirmatory factor analysis was run using SPSS and AMOS version 18. Five-factor model was found to be fit with CMIN/DF value of 2.68, RMSEA: 0.038, CFI: 0.927, NFI: 0.890, parsimony CFI: 0.66, and parsimony NFI: 0.634. A high correlation was observed between rational and intuitive styles. While running confirmatory factor analysis, a five-factor model with rational, intuitive, avoidant, dependent, and spontaneous was prepared with high correlation between rational and intuitive styles. Hence, an overlap among different decision-making styles was observed.

In a study conducted by Roberto *et al.*, CFA was performed, five-factor model showed significant fit, Chi-square ( $n = 700$ ) = 93, 39,  $P < 0.001$ , and an acceptable value for the CMIN/df (3.74). The RMSEA (0.058) and Adjusted Goodness-of-Fit Index (0.931) were indicative for fair fit.<sup>[19]</sup> Our results of confirmatory factor analysis were similar to this study. Similarly, in a study conducted by Peter Thunholm, the correlated five-factor model showed a significant fit, Chi-square (269,  $n = 206$ ) = 520.46,  $P < 0.0001$ , and a reasonable value for the fit indexes, Chi-square/df = 1.94, RMSEA = 0.075.<sup>[20]</sup> The current study obtained similar results with CFA.

Loo, in one of his researches, suggested that results from the item and scale analyses support the construct validity of this new measure. However, the study recommended further validation work, for example, applying the GDMS in cross-cultural settings.<sup>[18]</sup> Results of the current study support

**Table 5: Baseline comparisons**

Model	NFI delta 1	RFI rho 1	IFI delta 2	TLI rho 2	CFI
Default model	0.890	0.846	0.928	0.898	0.927

CFI: Comparative Fit Index, RFI: Relative Fit Index, TLI: Tucker-Lewis Index, IFI: Incremental Fit Index, NFI: Normed Fit Index

**Table 6: Root mean square error of approximation**

Model	RMSEA	Low 90	High 90	PCLOSE
Default model	0.038	0.033	0.043	1.000
Independent model	0.118	0.144	0.122	0.000

RMSEA: Root mean square error of approximation, PCLOSE: Value found with AMOS while CFA – pclose - close a pipe stream to or from a process

**Table 7: Standardized regression weights: Group number 1 - default model**

Variable	Style	Estimates
d_intuition	<--- Intuitive	0.497
d_innere_feeling	<--- Intuitive	0.505
d_instinct	<--- Intuitive	0.496
d_advise	<--- Dependent	0.474
d_steer	<--- Dependent	0.530
d_assistance	<--- Dependent	0.618
d_support	<--- Dependent	0.627
d_double_check	<--- Rational	0.492
d_logical	<--- Rational	0.501
d_options	<--- Rational	0.482
d_putoff_uneasy	<--- Avoidant	0.552
d_avoid	<--- Avoidant	0.538
d_postpone	<--- Avoidant	0.684
d_put_off	<--- Avoidant	0.647
d_spur	<--- Spontaneous	0.579
d_quick	<--- Spontaneous	0.638
d_snap	<--- Spontaneous	0.566

this because four-factor model was derived with exploratory factor analysis in this study with high correlation between intuitive and rational styles of decision-making.

The present study demonstrated a strong agreement to intuitive, dependent, and rational styles whereas disagreement to avoidant and spontaneous styles. Hence, an overlap among different decision-making styles was observed.

**Conclusion and Recommendation**

The interrelationship among different life skills suggests the need for training using a comprehensive package like the “Life Skills Education Package” suggested by the WHO and UNICEF. Such life skill-based education shall contribute a lot in the emotional development of the youth and provide an equipped task force for countries like India where we have a large young population. Making adolescents mentally and emotionally strong would improve their decision-making skills and help us reap this demographic dividend.

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**Conflicts of interest**

There are no conflicts of interest.

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