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ORIGINAL ARTICLE

Technical actions of English academy football players within variety of small-sided games

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ABSTRACT

In English professional football academies, each club assigns a specific game format to each age group's fixtures. However, there is uncertainty about how these formats impact technical actions and skill development in youth academies. This study aimed to examine the frequency of technical actions in an elite football academy across two common game formats used in the Foundation Phase age-groups (Under-9 to Under-11). The research focused on both small-sided games (SSGs) and regular-sided games (RSGs) within a Category One Football Academy. Participants were video recorded playing forty minutes each in their designated SSG and RSG formats, with nineteen technical actions observed and analysed. The results showed a statistically significant difference in fifteen technical actions between the two formats, with an increase in all these actions during SSGs. Notable technical actions such as one-touch shots, receiving a pass under pressure, and players beaten through a dribble significantly increased in SSGs. Another action, players beaten through a forward pass (packing score), saw a rise in RSGs, though this was not statistically significant. These findings suggest SSGs are beneficial for enhancing technical skills such as shooting, receiving under pressure, and dribbling, while RSGs may better develop forward passing abilities.

Keywords: Performance analysis, Football, Technical actions, Youth development, Skill development, Small-sided games.

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INTRODUCTION

Football is considered a late-specialisation sport that requires a long-term development pathway (Bailey et al., 2010). English professional clubs operate youth academies designed to develop players with long-term potential into professionals (Elferink-Gemser et al., 2010). These academies aim to provide an optimal learning environment combining practice and competitive games to help players reach their potential (Macnamara and Collins, 2013) and progress through the academy's pathway to play in the first team (Relvas et al., 2010). Within these programmes, small-sided games (SSGs) are commonly used. SSGs are football matches with reduced pitch dimensions and fewer players compared to the traditional 11vs11 format (Kelly et al., 2018).

SSGs are popular in youth football due to their age-appropriate focus and the higher frequency of technical actions such as passing, dribbling, and shooting (Capranica et al., 2001; Silva et al., 2014). SSGs also enhance decision-making and simulate game subphases, such as 1vs1 and 2vs1 situations, more frequently than larger formats (Fenoglio, 2003; Goncalves et al., 2016). However, there are concerns about transitioning to larger formats such as 9vs9 and 11vs11 too early, as these formats can prioritise tactics over skill development and pose physical challenges during players' growth phases (Smith and Harrison, 2023).

Research on SSGs has focused on physiological impacts, showing that smaller formats result in higher heart rates, lactate thresholds, and perceived exertion (Hill-Haas et al., 2009; Impellizzeri et al., 2006). Technical action studies, typically involving players from Under-10 to Under-23, have examined common formats like 3vs3, 7vs7, and 11vs11 (Clemente et al., 2019; Almeida et al., 2013). However, most of this research is based within grassroots and recreational environments, with limited data on academy settings (Saramento et al., 2018). Notably, a 2003 Manchester United pilot comparing SSGs (4vs4) to regular-sized games (RSGs, 8vs8) found that SSGs were more enjoyable and improved technique and decision-making, though concerns about fatigue and positional awareness were raised (Fenoglio, 2003).

SSGs are associated with increased technical actions, including receiving passes (Aslan, 2013; Clemente et al., 2019), dribbling (Aslan, 2013; Hinterman et al., 2021), passing (Almeida et al., 2013; Garcia-Angulo et al., 2020), and shooting (Aslan, 2013; Katis and Kellis, 2009). However, research has largely focused on the frequency of these actions rather than their functional utility within game contexts (Vilar et al., 2014). These findings ignore the influence of the open and dynamic environment of the performance context of football (Passos et al. 2008).

Additionally, studies have overlooked the effects of opponent pressure on actions like pass reception, an essential skill related to tactical pressing (Andrienko et al., 2017). This study will compare attempts to receive possession under pressure in SSGs and RSGs, highlighting how these formats influence youth players' development of key skills. Prior research has mainly measured the frequency of passes (Aslan, 2013), with limited focus on contextual factors like pressure. At the elite level, metrics such as a "*packing score*" evaluate the effectiveness of forward passes in bypassing opponents, a skill crucial for creating scoring opportunities (Robins and Hughes, 2019; Russomanno et al., 2020; González-Ródenas et al., 2020). Understanding which formats encourage such skills can benefit youth academies and their player development programmes.

Shooting, another critical aspect of success in football, has been studied in SSGs, but there is little data on how shooting opportunities arise. Elite-level goals are often scored with one or two touches (Çobanoglu, 2019; Smith and Bedwell, 2021; Tokul & Mülazimoglu, 2018), emphasising the importance of practicing and developing first-touch shooting within youth development Similarly, dribbling, a key technical action which

destabilises defences (Robins and Hughes, 2019), has not been adequately explored across different game formats. This study will investigate how frequently players bypass opponents through dribbling actions, providing insights for academy coaches and stakeholders. The purpose of this study is to investigate the technical actions performed by elite English youth players (Under-9 to Under-11) in a Category-One Football Academy. It aims to analyse technical actions across SSG and RSG formats and explore previously overlooked technical actions to offer valuable insights for player skill development within academy contexts.

MATERIALS AND METHODS

Participants

All participants were registered male youth players at a Category-One Football Academy based in the south of England. The perceived standard of practice of each professional club's academy corresponds to the category awarded by the Premier League within the Elite Player Performance Plan (EPPP), with each academy undergoing an internal audit process where they are categorised from One to Four, with Category One academies graded the highest (The Premier League Elite Player Performance Plan, 2012). Players were recruited depending on the necessary formats for each age group, as outlined in Table 1 below. In total, 46 players were utilised across the three age groups: Under-9, Under-10, and Under-11. Of these 46 players, 41 had been registered with the club from the beginning of their Under-9 season, with 5 joining after successful trial periods through identification by the club's recruitment department within their grassroots clubs. All players trained three times per week with the club, as well as engaging in the club's games programme against other academy teams. All participants were free from injury at the time of testing. Participant background is outlined in Table 2.

Table 1. Age group formats, ball size, pitch and goal dimensions.

	SSG			RSG			Goal Dimensions (m)	Ball size
	Format (P.U.)	Pitch Dimensions (Y)	Relative Pitch Area (Y)	Format (P.U.)	Pitch Dimensions (Y)	Relative Pitch Area (Y)		
U-9	5vs5 (10)	40x25	100	7vs7 (14)	60x40	171	6x12	3
U-10	5vs5 (10)	40x25	100	7vs7 (14)	60x40	171	6x12	4
U-11	7vs7 (14)	60x40	171	9vs9 (18)	80x50	222	7x16	4

Note. U = Under. P. U. = Players Used. Y = Yards. m = Metres.

Table 2. Participant background.

	Playing Background			Birth Quartile (Q)			
	Total Players	Recruited from Pre-Academy	Recruited Externally	Q1 (September – November)	Q2 (December – February)	Q3 (March – May)	Q4 (June – July)
U-9	14	13	1	9	4	1	0
U-10	14	13	1	9	1	2	2
U-11	18	15	3	9	4	4	1
Total	46	41	5	27	9	7	3

Note. U = Under.

Procedures

The lead researcher was employed within the coaching department of the academy in this study. The researcher had been employed by the club for four seasons at the time of the study and had achieved the UEFA B License and FA Advanced Youth Award qualifications. English football academies have been

described as inaccessible environments (Cushion and Jones, 2014), providing the researcher with a unique insight that would add value to existing literature on technical actions and game formats. The parents/guardians of the participants were provided with an information sheet that outlined the objectives and procedures of the study, as well as requiring informed consent prior to participation in the study. All participants and parents/guardians were provided with the opportunity to withdraw from the study should they wish, and they would not be part of the games within that training session. However, there were no objections to participation from any parents/guardians or players. Ethical approval was granted from the university's research ethics committee prior to data collection.

Data was collected over a period of four weeks. Two formats commonly played by each age group in their training and games programme were applied, as identified by each age-group coach (see Table 1). 'Format one' was the small-sided game format (SSG) that each group would occasionally play within their games programme, whilst 'format two' is their regular-sided game format (RSG) that was more frequently played. The pitch dimensions, goal size and ball size are all outlined in Table 1, in accordance with the 'FA guide to pitch and goalpost dimensions' (Football Association, 2012). Relative pitch area (RPA) is detailed within Table 1 for each format and corresponding pitch dimensions. RPA is defined as the surface area of the pitch divided by the number of players (Casamichana and Castellano, 2010). The teams for each game were selected by the lead coach of the age group to evenly distribute ability and playing position based on their perception, expertise, and experience. The games were refereed by another of the age group's coaches.

Data for each individual age-group was collected over a period of two weeks. In week one, two periods of 20 minutes were performed by the participants for one game format, with a 5-minute rest period in between, consistent with what the participants would usually perform on a matchday. The following week, this was repeated with the second format. Aligning with the work of Aguiar et al. (2012), standardised conditions were maintained within the different formats, to allow for a better understanding of the role of individual factors that may help researchers to find more reliable conclusions. For example, playing and rest periods were consistent to what the players usually experience within their games programme, and there was consistent application of the rules such as offside, whilst coach interference was not utilised, so as to not influence the players' actions and decisions within the research protocol.

All games were scheduled during the youth players regular training programme, beginning at 5.30pm after a 30-minute warm-up performed by members of the Sport Science department. All SSGs and RSGs were conducted on a third-generation artificial turf surface at the club's training ground that the players would regularly train on. Following explanation of the rules prior to the game, the participants played freely with no coaching input. Footballs were placed surrounding the pitch at 10m intervals to ensure quick restarts to maximise ball-rolling time within the games. Each game was recorded via two fixed internet protocol cameras within the club's training ground, by a member of the performance analysis staff. One camera was fixed providing a vertical view of the pitch, whilst the other provided a horizontal view. Each camera was fixed at a height of 40 feet above the pitch.

Alongside the information obtained from prior literature within the subject area, clear and concise operational definitions were created to align with the objectives of the study (see Table 3) between the researcher, with 4 years' experience within academy football as a coach, and other members of the coaching department of the club's academy, with consideration of the definitions utilised within previous literature, such as the work of Pulling et al. (2018) and Owen et al. (2004). Within observation, the computerised sport analysis software iCODA was utilised to analyse the recording via a specifically designed code window to incorporate the key technical actions that the researchers sought to analyse. For the purpose of this study, goalkeeper in-

possession data was excluded from outfield player results, due to the potential to skew the results for the outfield players due to the different positional requirements in-possession.

Table 3. Technical action definitions.

In-Possession actions	
Possession	Total individual possessions player obtains.
Touches	Total amount of touches player has on the ball – excluding non-deliberate contacts e.g., blocks, deflections.
Total Receive	Total times a player attempts to receive the ball.
Total Receive Under Pressure	Total times a player attempts to receive a deliberate pass from a teammate, with physical contact from opposition player 1 second before/after 1st ball contact.
Penetration Dribble	Player attempts to dribble directly at opposition player with aim of getting past them towards opposition goal
Turn Dribble	Player attempts to manipulate the ball to change direction of their dribble
Exploit Dribble	Player attempts to exploit open space with a dribble
1st Touch Dribble	Player attempts to use their 1st touch to evade an opposition player
Total Dribble	Total amount of attempted dribbles
Players Beaten by a Dribble	Opposition players evaded in a dribbling situation that has allowed the player to play forward towards the opposition goal
Release actions	
Total Passes	Total amount of attempted passes
Pass Behind	A pass when the ball is played towards the goal that the player is defending
Pass Beside	A pass when the ball was neither played towards the goal that the player is defending or towards the opponent's goal
Pass Ahead	A pass when the ball is played towards the opponent's goal
Players Beaten by a pass	Number of players beaten by a penetrating forward pass
Total Shots	Total amount of attempted shots
1 Touch Shot	A shot from 1 touch
2 Touch Shot	A shot from 2 touches
3+ Touch Shot	A shot from more than 3 touches

Data analysis

Normality of the variances was tested via the Shapiro-Wilks and the Kolmogorov-Smirnov tests for normality of distribution statistic, which found that the data did not meet parametric assumptions. Thus, with the data being non-parametric, the Mann-Whitney U test was utilised to compare the mean ranks of the technical actions of the SSG (n = 56) and the RSG (n = 80) with all age-groups data combined. A Mann-Whitney U test was utilised due to the data not meeting the requirements of paired samples, as more participants were required for the larger game formats. Statistical analysis was performed using the Statistical Package for Social Sciences software V28.0 (IBM, SPSS), and the statistical significance level was set at $p < .05$.

Reliability

Intra-observer and inter-observer reliability analysis were each conducted on 10% of the data collected (Cooper and Pulling, 2020; Pulling et al., 2018). 10% of data collected accounted for 14 participants. Intra-observer reliability was performed two weeks following the completion of the initial coding to account for limiting recollection of the event (O'Donoghue, 2014). The inter-observer reliability test involved a performance analyst at the club where the study was conducted, with 3 years in the role and previous experience using Sportscode. Operational definitions were provided as well as a 30-minute training session on how to conduct the analysis of the footage. Intra-class correlation coefficient was utilised to assess reliability. Data was tested for absolute agreement through the two-way mixed model, with 95% confidence intervals set. Inter-observer and intra-observer reliability is outlined in Table 4. Strength of reliability 0.9 and

above was deemed excellent, between 0.75 and 0.9 deemed good, and between 0.5 and 0.75 deemed moderate (Koo and Li, 2016).

Table 4. Intra-class correlation coefficient.

Technical Action	Inter-Observer		Intra-Observer	
	ICC Value	Strength of Reliability	ICC Value	Strength of Reliability
Possession	0.949	Excellent	0.997	Excellent
Touches	0.972	Excellent	0.997	Excellent
Total Receive	0.918	Excellent	0.990	Excellent
Total Receive Under Pressure	0.956	Excellent	1.000	Excellent
Penetration Dribble	0.982	Excellent	0.997	Excellent
Turn Dribble	0.959	Excellent	0.993	Excellent
Exploit Dribble	0.816	Good	0.988	Excellent
1st Touch Dribble	0.943	Excellent	0.986	Excellent
Total Dribble	0.968	Excellent	0.991	Excellent
Players Beaten by a Dribble	0.940	Excellent	0.998	Excellent
Total Passes	0.840	Good	0.985	Excellent
Pass Behind	0.928	Excellent	0.987	Excellent
Pass Beside	0.894	Good	0.984	Excellent
Pass Ahead	0.925	Excellent	0.988	Excellent
Players Beaten by a pass	0.897	Good	0.994	Excellent
Total Shots	1.000	Excellent	1.000	Excellent
1 Touch Shot	1.000	Excellent	1.000	Excellent
2 Touch Shot	1.000	Excellent	1.000	Excellent
3+ Touch Shot	1.000	Excellent	1.000	Excellent

RESULTS

Nineteen technical actions observed and analysed. Results indicated a statistically significant difference in fifteen technical actions within SSGs compared to RSGs. All fifteen significant differences demonstrated an increase in actions within SSGs. Previously unidentified technical actions such as one-touch shots, receiving under pressure, and players beaten through a dribble, demonstrated a significant increase within SSGs. Player's beaten through a forward pass (packing score) was another previously unidentified technical action within the literature, however this action increased within RSGs, although this increase was not deemed statistically significant.

In-Possession actions

SSG's were found to have significantly higher actions for possession (u = 1342.500, z = -3.98, p = < .001), touches (u = 1529.500, z = -3.14, p = .002), total receive (u = 1767.000, z = -2.10, p = .036), and total receive under pressure (u = 1763.000, z = -2.20, p = .028). SSG's were found to have significantly higher actions for penetration dribble (u = 1514.000, z = -3.28, p = .001), turn dribble (u = 1409.500, z = -3.73, p = <.001), exploiting space dribbles (u = 1653.000, z = -2.70, p = .007), total dribbles (u = 1321.500, z = -4.07, p = <.001) and players beaten through a dribble (u = 1541.000, z = -3.17, p = .002). Although there was an increase in actions for 1st touch dribbles in the SSG's (u = 1993.500, z = -1.36, p = .175), no significant difference was detected.

Release technical actions

A higher number of actions were found to have occurred for all actions in SSG's, excluding forward passes (u = 2128.500, z = -0.499, p = .617) and players beaten by a forward pass (u = 2239.000, z = -0.004, p = .996), which occurred more in RSG's, although this difference was not deemed statistically significant. SSG's

were found to have significantly higher actions for backwards passes (u = 1777.500, z = -2.08, *p* = .037) and sideways passes (u = 1785.500, z = -2.05, *p* = .041). There was a significant increase in total shots (u = 1029.000, z = -5.45, *p* = <.001), one touch shots (u = 1255.000, z = -4.70, *p* = <.001), two touch shots (u = 1562.500, z = -3.52, *p* = <.001) and shots that occurred from three plus touches (u = 1543.500, z = -3.37, *p* = <.001) within SSG's when compared to RSG's.

Table 5. Possession technical actions.

	Mann-Whitney U Ranks						Mann-Whitney U Tests Statistic		
	SSG (N = 56)			RSG (N = 80)					
	Total Frequency	Mean Rank	Sum of Ranks	Total Frequency	Mean Rank	Sun of Ranks	Mann- Whitney U	Z	Asymp. Sig. (2 tailed)
Possession	1054	84.53	4733.50	1121	57.28	4582.50	1342.500	-3.976	<.001
Touches	3076	81.19	4546.50	3381	59.62	4769.50	1529.500	-3.142	.002
Total Receive	510	76.95	4309.00	583	62.59	5007.00	1767.000	-2.100	.036
Total Receive under Pressure	99	77.02	4313.00	86	62.54	5003.00	1763.000	-2.201	.028
Penetration Dribble	163	81.46	4562.00	136	59.43	4754.00	1514.000	-3.276	.001
Turn Dribble	208	83.33	4666.50	161	58.12	4649.50	1409.500	-3.725	<.001
Exploit Dribble	110	78.98	4423.00	89	61.16	4893.00	1653.000	-2.698	.007
First Touch Dribble	32	72.90	4082.50	26	65.42	5233.50	1993.500	-1.356	.175
Total 1vs1	513	84.90	4754.50	413	57.02	4561.50	1321.500	-4.072	<.001
Players Beaten by Dribble	162	80.98	4535.00	119	59.76	4781.00	1541.000	-3.165	.002

Table 6. Release technical actions.

	Mann-Whitney U Ranks						Mann-Whitney U Test Statistic		
	SSG (N = 56)			RSG (N = 80)					
	Total Frequency	Mean Rank	Sum of Ranks	Total Frequency	Mean Rank	Sun of Ranks	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Total Passes	639	76.12	4262.50	767	63.17	5053.50	1813.500	-1.891	.059
Pass Behind	153	76.76	4298.50	139	62.72	5017.50	1777.500	-2.083	.037
Pass Beside	160	76.62	4290.50	178	62.82	5025.50	1785.500	-2.047	.041
Pass Ahead	154	66.51	3724.50	245	69.89	5591.50	2128.500	-.499	.617
Players Beaten by a Pass	204	68.48	3835.00	314	68.51	5481.00	2239.000	-.004	.996
Total Shots	205	90.13	5047.00	117	53.36	4269.00	1029.000	-5.446	<.001
One Touch Shot	85	86.09	4821.00	39	56.19	4495.00	1255.000	-4.696	<.001
Two Touch Shot	43	80.60	4513.50	27	60.03	4802.50	1562.500	-3.520	<.001
Three Plus Touch Shot	77	80.94	4532.50	50	59.79	4783.5	1543.500	-3.373	<.001

DISCUSSION

The purpose of this study was to evaluate the technical actions performed by elite English youth players within the Foundation Phase of a Category One Football Academy across SSGs and RSGs. This study found that player receiving actions increased within SSGs, consistent with the findings of Clemente et al. (2019). Within SSGs, the frequency of receiving a pass under pressure from an opposition player increased significantly when compared to RSGs. This is significant when relative pitch area (RPA) is considered. For example, with the Under-9 and Under 10 players, playing 5vs5 on a 40x25 yard pitch would equate to an RPA of 100 yards per player, whilst 7vs7 on a 60x40 yard pitch would equate to an RPA of 171 yards per player. This suggests that by playing with less space as an individual, players are more likely to be exposed

to receiving the ball under pressure, thus providing challenges related to their perceptual awareness and scanning behaviours, as well as technical capabilities to control the ball.

McGuckian et al. (2017) found that amongst experienced players (mean age 22.5, SD = 1.97), when playing on a pitch with decreased RPA, the participants visually explored (scanned) more frequently, compared to when playing on a full 11vs11 pitch. This was a result of the spatial constraints the environment provided the players, whereby the players scanned more frequently before they received a pass to facilitate earlier perception of their affordances, enabling quicker action and subsequent success when in possession. It could be hypothesised that through playing SSGs, with a potentially decreased RPA and an increase in receiving and receiving under pressure actions compared to RSGs, youth players may also be required to scan more frequently to successfully receive a pass. The findings related to receiving actions provide significant practical implications for academy and youth development programmes, demonstrating that should a player require improvement in receiving, receiving under pressure, or scanning, SSGs may be a more appropriate environment than RSGs within their individual programme. The impact of game format and RPA on scanning within youth football is an area that warrants further investigation.

Total passing actions increased within SSGs, although these differences were not significant. These findings contrast with those of Hintermann (2021), Oh and Joo (2018) and Aslan (2013), all of whom found a significant increase within the SSG format. Forward passes decreased within the SSG format, although this difference was not statistically significant. The finding of a lack of significant increase in forward passes contrasts the findings of Oh and Joo (2018), who compared 8vs8 and 11vs11 for U12 players. This finding can be attributed to the decrease in players within the SSG format, therefore the player in possession has less options to pass forward to, as well as the decreased RPA potentially affecting the players perceived space to successfully complete a pass. Players bypassed through a forward pass increased slightly within the RSG format, although this difference was not statistically significant. When the context of decreased RPA within SSGs compared to RSGs is considered, this finding can be explained due to the decreased space that could be exploited through a forward pass, as well as the previously mentioned decrease in players on the pitch within SSGs. This finding provides a further consideration for coaches and multidisciplinary staff when considering the game format.

This study found that dribbling actions increased within the SSG format when compared to the RSGs, comparative to the findings of Hintermann (2021) and Katis and Kellis (2009). This study analysed specific dribbling actions, finding that penetrating, turning, and exploiting space actions all increased significantly within SSGs, comparable to the findings of Garcia-Angulo et al. (2020) Previously, no study had analysed the opposition players beaten through a dribbling action. It was found that players beaten through a dribbling action increased significantly within the SSG format. Through playing more SSGs, coaches may be able to expose players to increased situations where they are required to beat a player with a variety of dribbling capabilities. These include a penetration dribble, where players are faced with direct pressure from an opposition player in front of them. Another potential method analysed is the use of a turn, where the pressure may be applied from behind by an opposition player, and they are required to change the direction of their dribble. Lastly, the use of an exploiting space dribble, where the player is exposed to open space that they can take advantage of. Considering these findings, a player with a development focus corresponding to penetrative dribbling, beating players, or turning, may require more frequent exposure to SSGs rather than RSGs within their individual programme.

Within the shooting technical actions, this study aligned with previous findings of an increase in total shots and goals scored within smaller formats (Almeida et al., 2013; Clemente et al., 2019; Katis and Kellis, 2009).

The perceptual capabilities required to score with limited touches due to proximity of opposition defenders is a fundamental attribute required by elite level goal scorers (Smith and Bedwell, 2021). When considering previous research in this area (Çobanoglu, 2019; Smith and Bedwell, 2021; Tokul and Mülazimoglu, 2018), it can be concluded that SSGs are more appropriate playing environment for youth players to develop and practice the technical and perceptual capabilities to become an elite level goal scorer.

CONCLUSION

The findings of this study, outlining the specific and repetitive actions that foundation phase players engage in within SSGs compared to RSGs and vice-versa, provide insight to allow practitioners to utilise their club's training and games programme to optimise individual development. Of the nineteen actions analysed, fifteen demonstrated a significant increase within SSGs. Through these findings, it can be concluded that to develop important techniques such as penetrating dribbles, first-touch shooting and receiving under direct pressure, smaller formats should be utilised than those that are currently common within the English academy system, providing players with repetition of these key technical actions within their games programme to promote their long-term skill development. Larger formats may be more beneficial for youth players to develop their forward and penetrative passes within their games programme. A limitation of this study is exclusion of older age groups as well as the 11vs11 format, commonly introduced at Under-13 within the English Academy system. This is an area that warrants further investigation.

AUTHOR CONTRIBUTIONS

KC led this project, undertook observations, and wrote the manuscript. SS assisted with concept, planning and data analysis.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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