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# Properties of the teacher-report Strengths and Difficulties Questionnaire and Dysregulation Profile in Italian preschoolers

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## ABSTRACT

Early identification of emotional and behavioural difficulties is necessary to promote children's well-being. The Strengths and Difficulties Questionnaire (SDQ) is a widely used screening tool for assessing Emotional Symptoms, Peer Problems, Conduct Problems, Hyperactivity/Inattention, and Prosocial Behaviour. The scores of 5 or 15 items can also be combined to measure the Dysregulation Profile (SDQ-DP). Few studies have explored the psychometric properties of the SDQ and SDQ-DPs teacher-report in Italian samples, and none have focused exclusively on preschool age. The current study aimed to fill this gap in a sample of 842 Italian preschoolers (mean age: 5.05 years) by testing factor structures, scale reliability and the association with relevant variables (e.g. internalizing and externalizing problems, emotion regulation, temperamental dimensions, and social preference). Results showed that a modified 5-factor solution better fitted the SDQ, while a bifactor model best represented the SDQ-DP 15-item. The 5-item version of the SDQ-DP did not show acceptable fit. The reliabilities were generally good, except for the Peer Problems scale. Despite some issues related to the SDQ and SDQ-DP factor structures, the findings provided partial support for their use in capturing important dimensions of children's behavioural and regulatory difficulties, as evidenced by acceptable reliability and associations with external variables.

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**KEYWORDS** Strengths and difficulties questionnaire; preschoolers; teacher-report; Emotional Symptoms; Conduct Problems

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## Introduction

Identifying emotional and behavioural difficulties is paramount for adjusted development and well-being in children. Therefore, reliable measures for preschoolers are crucial to promote early interventions. The Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) is among the most used screening tools for emotional and behavioural problems from early childhood to late adolescence and can be filled in by parents, teachers, or, from 11 years, by children themselves. It provides scores for Conduct Problems, Hyperactivity/Inattention, Emotional Symptoms, Peer Problems, and Prosocial Behavior, which can be aggregated to obtain three scales for Internalizing and Externalizing Problems and Prosociality (Goodman et al., 2010). As a versatile instrument, the SDQ can also be used to derive a composite indicator of emotional, cognitive, and behavioural dysregulation, referred to as the Dysregulation Profile (SDQ-DP). Although the DP was originally developed using the Child Behaviour Checklist (CBCL-DP; Althoff et al., 2010), an analogous SDQ-based version has also been proposed, defined either with 5 or 15 items. The SDQ-DP 5-item was first introduced by Holtmann et al. (2011), who, through stepwise linear discriminant analyses, identified the specific combination of SDQ items that best captured the pattern of dysregulation described by the CBCL-DP. Specifically, five items (i.e., items 2: 'Restless, overactive,' 8: 'Many worries,' 12: 'Often fights,' 13: 'Often unhappy,' 22: 'Steals'), drawn from the Conduct Problems, Hyperactivity/Inattention, and Emotional Symptoms subscales were selected. This 5-item scale provides a parsimonious yet valid representation of the broad dysregulation construct, encompassing emotional, behavioural, and cognitive difficulties. A broader operationalization of the construct, including all items from the same subscales (SDQ-DP 15-item), was later proposed by Deutz et al. (2018) and found reliable in subsequent studies (e.g., Costantini et al., 2022).

Systematic reviews (Stone et al., 2010) and several studies supported the validity of the SDQ overall, showing that its scores sufficiently correlated with other measures of psychopathology (Goodman & Scott, 1999; Klasen et al., 2000) and confirmed the five-factor structure of the measure initially proposed by Goodman (Goodman, 1997; Kersten et al., 2016; Stone et al., 2010). Nonetheless, fewer data are available regarding its use with younger children, suggesting that more research is needed (Kersten et al., 2016). The preschool period is characterized by specific developmental tasks, including the development of emotional and behavioural skills. Children start moving from more dyadic and reactive strategies (e.g., relying on caregivers to soothe distress or impulsively expressing emotions) to self-regulated and effortful ones (e.g., using language to label emotions, delaying gratification, or simple problem-solving) (Crowell, 2021). Early detection of these aspects is paramount to deeply understand their development and to carry on effective interventions

from an early age, as behavioural and emotional difficulties in early childhood can lead to later problems in various life domains. This underscores the importance of reliable screening tools for this developmental stage.

In the Italian context, only a few previous studies explored the psychometric properties of the teacher-report version of the SDQ. Tobia et al. (2013) validated the SDQ teacher-report in children aged 3 to 15, suggesting a five-factor structure with two items (i.e., '*Restless, overactive*', '*Constantly fidgeting or squirming*') loading into Conduct Problems rather than Hyperactivity/Inattention. Levantini et al. (2024) explored the psychometric properties of the SDQ-DPs teacher-report in a sample of children aged 7–12. Results suggested that a first-order model for the SDQ-DP 5-item and a bifactor model for the SDQ-DP 15-item best fitted the data and that the 5-item scale was less psychometrically robust (e.g., scale reliability was lower and the structure was not invariant across genders). Weaker reliability, validity, and stability of the 5-item compared to the 15-item DP were also reported by Deutz et al. (2018). Overall, the SDQ-15 item benefits from broader content coverage and has been more widely used, while the 5-item version, although briefer and more practical, has been less frequently used, and its utility across different populations and age groups remains underinvestigated.

None of these studies exclusively focused on early childhood, thus, the current study aimed to fill this gap by exploring the psychometric properties (i.e., factor structure, scale reliability, and homogeneity) of the SDQ and SDQ-DPs teacher-report in a sample of Italian preschoolers and their associations with measures of internalizing and externalizing problems, CBCL dysregulation profile, emotion regulation, temperamental dimensions, and social preference. We expected the SDQ difficulty scales and the SDQ-DPs to be associated with higher internalizing and/or externalizing problems and CBCL-DP, poorer emotion regulation skills, lower effortful control and higher surgency. We also hypothesized that social preference would negatively correlate with the SDQ difficulty scales and the SDQ-DPs because children with behavioural or emotional difficulties are often less well-liked by peers and may struggle to form or maintain positive peer relationships (e.g., Qashmer, 2023). Finally, we hypothesized that the SDQ Prosocial Behavior subscale would be negatively associated with internalizing and externalizing symptoms and emotion regulation difficulties and positively associated with effortful control and social preference.

## Method

### Participants

Participants were drawn from projects – each with its own procedures and measures – carried out at different Italian Universities in the three

main areas of Italy (North, Central, and South) to create a representative sample. We only included participants with complete SDQ responses. For all other variables, we selected participants with complete data on the relevant measures; exceptions are detailed in the Measures section. As a result, the total number of participants varies slightly across analyses, depending on data availability for each specific measure. The final sample comprised 842 preschool children (51% males) aged between 4.00 and 6.33 years (mean age = 5.05 years,  $SD = 0.47$  years).

Before completing the questionnaires, parents signed a written informed consent form. The procedures were in accordance with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The projects were approved by the local Ethical Committees (ET-20-16; CGPER-2020-01-16-12; Case ID 2-5894000036747).

### Measures

*Strengths and Difficulties Questionnaire (SDQ).* The SDQ (Goodman, 1997; Tobia et al., 2013) is a 25-item questionnaire that assesses youths' emotional and behavioural difficulties and strengths. We used the teacher-report form, available for the whole sample. The SDQ-DPs were computed with 5 items (Holtmann et al., 2011) or 15 items (Deutz et al., 2018).

*Child Behavior Checklist (CBCL).* The CBCL for ages 1.5 to 5 years (Achenbach & Rescorla, 2004; Frigerio et al., 2006) is a parent-report checklist assessing emotional and behavioural difficulties in preschoolers. We used scores for Internalizing Problems ( $\alpha = 0.781$ ), Externalizing Problems ( $\alpha = 0.837$ ), and Dysregulation Profile (i.e., sum of the Attention Problems, Aggressive Behaviour and Anxious/Depressed scales) ( $\alpha = 0.850$ ). The CBCL was available for 269 children; however, 8 participants had missing values on the Internalizing Problems scale and were excluded from analyses involving this variable.

*Emotion Regulation Checklist (ERC).* The ERC (Molina et al., 2014; Shields & Cicchetti, 1997) is a 24-item questionnaire assessing Positive Emotion Regulation (8 items) and Lability/Negativity (16 items) in children. We used the teacher-report ( $N = 747$ ) and the parent-report ( $N = 290$ ) forms. Seven participants had missing values on the parent-reported Lability/Negativity scale and were excluded from analyses involving this variable. Cronbach's  $\alpha$  were 0.714 and 0.846 for the teacher-report Positive Emotion Regulation and Lability/Negativity subscales, whereas, for the parent form, they were .783 and .846.

*Child Behavior Questionnaire (CBQ) short-form.* The CBQ short-form (Matricardi et al., 2010; Putnam & Rothbart, 2006) is a 94-item parent-report measure assessing several aspects of children's temperament. We used the

Effortful Control (26 items;  $\alpha = 0.749$ ) and Surgency (25 items;  $\alpha = 0.689$ ) scores. The CBQ was available for 278 children.

*Social Preference.* Students were asked to nominate the classmates they liked most and those they liked least (Coie et al., 1982). Nominations obtained were divided by the number of nominators, and least-liked scores were subtracted from most-liked scores to obtain a social preference score, available for 745 children.

### *Statistical analyses*

To test the best fitting models of the SDQ and SDQ-DPs, we conducted confirmatory factor analyses (CFA) with the R (version 4.4.0) package *lavaan* (version 0.6–18) using the WLSMV estimator, which applies diagonally weighted least squares with mean and variance adjustments. Overall, we tested eight models. For the SDQ structure we tested four models: 1) the original 5-factor model (Goodman, 1997); 2) Tobia et al.'s (2013) modified 5-factor model, with items 2 and 10 of the Hyperactivity/Inattention subscale loading into Conduct Problems; 3) a 3-factor model with three correlated factors (i.e., Internalizing Problems, Externalizing Problems, Prosocial Behaviour) (Goodman et al., 2010); 4) a second-order model with Internalizing and Externalizing Problems as second-order factors and the original subscales as first-order factors (Goodman et al., 2010). In addition, we tested a first-order one-factor model for the SDQ-DP 5-item and three competing models for the SDQ-DP 15-item (Deutz et al., 2018): 1) a first-order one-factor model; 2) a second-order model with the three SDQ subscales as first-order constructs and a second-order factor; 3) a bifactor model where all the items loaded into the general factor Dysregulation Profile and, at the same time, into their respective specific factors. Scaled fit statistics were assessed using both traditional benchmarks (TLI/CFI  $\geq 0.95$ , RMSEA/SRMR  $\leq 0.06$ ; Hu & Bentler, 1999) and dynamic, model-specific cut-offs (e.g., McNeish, 2023) computed via the DDDFI function in the Dynamic R package (Wolf & McNeish, 2023). The dynamic approach estimates cut-offs for CFI and RMSEA adjusted for each model across four levels (i.e., Consistent specificity, Close specificity, Fair sensitivity, and Mediocre sensitivity). For interpretive consistency, we focused on the Fair sensitivity level. The complete set of dynamic cut-offs for all models is provided in Supplementary Tables S1 and S2. AIC, BIC and SABIC were also reported to facilitate model comparison.

Scale reliability and homogeneity of the SDQ subscales and the SDQ-DPs were assessed using Cronbach's alpha, ordinal alpha, and mean inter-item correlations (MIC; recommended range: 0.15–0.50) (Clark & Watson, 1995). Finally, zero-order correlations were run in IBM SPSS Statistics to test the associations between the SDQ subscales and DPs scores and measures of

internalizing and externalizing problems, emotion regulation, temperamental dimensions, and social preference.

Descriptives for the SDQ items and their correlations are provided as supplementary materials (Tables S3 and S4).

## Results

### Confirmatory factor analyses

*SDQ structure.* Table 1 shows the fit indices of the competing models for the SDQ. None of the models reached an acceptable fit according to conventional or dynamic criteria. Among them, the modified five-factor model (Tobia et al., 2013) showed a comparatively better, but still unsatisfactory, fit to the data. All items significantly loaded in their respective factors (range: 0.329 - 0.919) (Table S5).

*SDQ-DP 5-item.* The CFA revealed poor goodness-of-fit for the one-factor model ( $\chi^2(5) = 253.323$ ,  $p \leq 0.001$ ; TLI = 0.628, CFI = 0.814; RMSEA = 0.243 [0.218, 0.269]; SRMR = 0.209). The modification indices ( $MI > 70$ ) suggested strong covariances between the error terms of several item pairs (e.g., items 8 and 13; items 2 and 12). However, after adding these parameters, the model failed to converge. Based on this, no further analyses have been conducted with the SDQ-DP 5-item.

*SDQ-DP 15-item.* Table 2 shows the fit indices of the competing models for the SDQ-DP 15-item. The CFA revealed that a bifactor model best fitted the data. The CFI met the conventional .95 cut-off (Hu & Bentler, 1999), but RMSEA and SRMR remained above recommended levels. When evaluated using dynamic, model-specific cut-offs (e.g., McNeish, 2023), the model did not reach satisfactory fit. All items significantly loaded into the general DP factor and their specific factors (range: 0.203 - 0.941 for DP; -0.224 - 0.812 for specific factors) (Table S6).

**Table 1.** Fit indices of the competing models for the SDQ.

Model	$\chi^2$	<i>df</i>	TLI	CFI	RMSEA	SRMR	AIC	BIC	SABIC
Original 5-factor model	1660.505***	265	0.879	0.893	0.079 [0.076, 0.083]	0.110	28,303.32	28,587.47	28,396.93
Modified 5-factor model	1566.551***	265	0.887	0.900	0.076 [0.073, 0.080]	0.108	28,122.67	28,406.82	28,216.27
3-factor model	1921.481***	272	0.860	0.873	0.085 [0.081, 0.089]	0.124	28,595.86	28,846.86	28,678.54
Second-order model	1661.489***	268	0.880	0.893	0.079 [0.075, 0.082]	0.111	28,310.21	28,580.15	28,399.13

\*\*\* $p \leq .001$ .

**Table 2.** Fit indices of the competing models for the SDQ-DP 15-item.

Model	$\chi^2$	<i>df</i>	TLI	CFI	RMSEA	SRMR	AIC	BIC	SABIC
First-order model	1560.077***	90	0.820	0.845	0.139 [0.133, 0.145]	0.167	17,619.07	17,761.14	17,665.87
Second-order model	678.901***	87	0.925	0.938	0.090 [0.084, 0.096]	0.104	16,855.65	17,011.93	16,907.13
Bifactor model	439.929***	75	0.946	0.962	0.076 [0.069, 0.083]	0.082	16,537.72	16,750.83	16,607.92

\*\*\* $p \leq .001$ .

**Table 3.** Internal consistency measures.

	$\alpha$	Ordinal $\alpha$	MIC
SDQ – Conduct Problems (7 items) <sup>a</sup>	0.833	0.903	0.399
SDQ – Hyperactivity/Inattention (3 items) <sup>a</sup>	0.780	0.865	0.542
SDQ – Emotional Symptoms	0.727	0.851	0.358
SDQ – Peer Problems	0.515	0.724	0.175
SDQ – Prosocial Behaviour	0.784	0.871	0.422
SDQ – DP 15-item	0.847	0.899	0.256

Note. SDQ: Strengths and Difficulties Questionnaire. DP: Dysregulation Profile.

<sup>a</sup>Modified structure (Tobia et al., 2013).

### Scale reliability and homogeneity

Table 3 shows the Cronbach's alphas, ordinal alphas, and MIC of the SDQ subscales and DP 15-item scores. All scales showed acceptable-to-good Cronbach's alpha values, except for the Peer Problems subscale. Ordinal alpha coefficients indicated good-to-excellent reliability across all scores. The mean inter-item correlations (MICs) suggested that items within each scale were sufficiently correlated without being redundant; only the Hyperactivity/Inattention scale showed a MIC slightly above the recommended .50 cut-off.

### Zero-order correlations

Correlations (Table 4) of the SDQ subscales and the DP 15-item with measures of internalizing and externalizing problems, emotion regulation, temperamental dimensions, and social preference were in the expected direction.

## Discussion

The current study explored the psychometric properties of the SDQ teacher-report in a sample of Italian preschoolers, confirming previous analyses conducted on samples with a wider age range (Tobia et al., 2013), and contributed for the first time to test the SDQ-DPs in this age span.

**Table 4.** Zero-order correlations between study variables.

	SDQ Conduct Problems <sup>a</sup>	SDQ Hyperactivity/ Inattention <sup>a</sup>	SDQ Emotional Symptoms	SDQ Peer Problems	SDQ Prosocial Behaviour	SDQ-DP 15-item
CBCL- Internalizing (N = 261)	0.052	0.048	0.102	0.001	-0.143*	0.083
CBCL- Externalizing (N = 269)	0.151*	0.197**	0.053	0.027	-0.200**	0.175**
CBCL-DP (N = 269)	0.098	0.168**	0.062	0.025	-.0182**	0.138*
ERC-T – Lability/ Negativity (N = 747)	0.759**	0.516**	0.344**	0.325**	-0.407**	0.733**
ERC-T Positive Regulation (N = 747)	-0.285**	-0.378**	-0.335**	-0.437**	0.459**	-0.415**
ERC-P – Lability/ Negativity (N = 283)	0.212**	0.183**	0.047	0.013	-0.130*	0.203**
ERC-P – Positive Regulation (N = 290)	0.006	-0.004	0.037	-0.062	0.120*	0.015
CBQ-Effortful Control (N = 278)	-0.156**	-0.169**	0.006	-0.022	0.099	-0.147*
CBQ-Surgency (N = 278)	0.238**	0.174**	-0.048	0.016	-0.032	0.180**
Social Preference (N = 745)	-0.286**	-0.292**	-0.102**	-0.250**	0.223**	-0.299**

Note. SDQ: Strengths and Difficulties Questionnaire; DP: Dysregulation Profile; CBCL: Child Behavior Checklist; ERC-T: Emotion Regulation Checklist teacher-report; ERC-P: Emotion Regulation Checklist parent-report; CBQ: Child Behaviour Questionnaire. <sup>a</sup>Modified structure (Tobia et al., 2013). \* $p \leq .05$ . \*\* $p \leq .01$ .

Confirmatory factor analyses revealed that the modified 5-factor model proposed by Tobia et al. (2013) better fitted our data. This further supports the possibility that Italian teachers may interpret the hyperactive behaviours described by items 2 (*'Restless, overactive, cannot stay still for long'*) and 10 (*'Constantly fidgeting or squirming'*) as misconduct, likely considering attention problems distinct from hyperactivity or impulsivity. It is important to highlight that the results were not entirely conclusive. The original 5-factor and second-order models yielded similar fit statistics; nonetheless, the second-order model is less parsimonious, and the original 5-factor model showed a slightly poorer fit. Moreover, the modified model was developed and validated in Italian samples using the Italian version of the SDQ, which increases its cultural relevance in our work. Nevertheless, these findings should be interpreted with caution; although the modified 5-factor model (Tobia et al., 2013) yielded theoretical and cultural value, the CFA results indicated poor model fit under both conventional and dynamic

criteria. Further research is needed to reassess the SDQ teacher-report structure in preschool samples.

Results showed a poor fit for the SDQ-DP 5-item. This may reflect intrinsic limitations of the measure, such as the low number of items, which can diminish the ability to assess a latent construct. Low item variance and high inter-item correlations are common in mental health measures; however, these characteristics may contribute to the inadequate model fit, especially when measuring multifaceted and complex constructs with brief scales. Other factors, including, for instance, content heterogeneity among the items, may also have contributed to the poor fit. Lastly, the preschool age of the children may have influenced results, as self-regulatory abilities are still developing at this stage, and the SDQ-DP 5-item, which was initially developed for a broader age range, may not fully capture dysregulation as it manifests in younger children. This scale might, therefore, be less sensitive for assessing early manifestations of dysregulation in preschoolers. Further investigation is warranted in future studies.

In line with previous studies with older children, CFA confirmed a bifactor structure for the SDQ-DP 15-items (Deutz et al., 2018; Levantini et al., 2024). This may preliminarily suggest a degree of measurement invariance across developmental stages. If confirmed, this would support the use of the SDQ-DP for tracking dysregulation across age groups, improving its value for developmental and longitudinal research. However, although the bifactor model showed the best relative fit and the CFI exceeded the conventional 0.95 cut-off (Hu & Bentler, 1999), other indices did not reach optimal levels based on conventional and/or dynamic thresholds, indicating that some structural issues may still be present. Future research should formally test invariance across age and examine potential model refinements.

Scale reliability and homogeneity were good for all scores, except for Peer Problems, which aligned with previous studies (e.g., Tobia et al., 2013). Items evaluating Peer Problems possibly describe behaviours and difficulties that may not always co-occur in the same child or may tap into different aspects of peer relationships (e.g., peer rejection, social isolation, victimization), making the scale less homogeneous. However, ordinal  $\alpha$  and MIC suggested acceptable reliability for this subscale as well.

Regarding correlation analysis, the SDQ Conduct Problems and Hyperactivity/Inattention subscales showed a strong positive association with teacher-reported lability/negativity and small positive associations with the CBCL Externalizing Problems, parent-reported lability/negativity, and surgency. They also showed small-to-moderate negative associations with effortful control, social preference, and teacher-reported positive emotion regulation (e.g., Martel et al., 2012). Hyperactivity/Inattention also showed a small association with the CBCL-DP, confirming the common dysregulation pattern underlying both inattention and the DP. The

Emotional Symptoms and Peer Problems subscales were moderately correlated with teacher-reported emotion regulation difficulties and showed a small negative association with social preference, but they were not correlated with CBCL Internalizing Problems. This could indicate that the items describing internalizing difficulties are not as sensitive to such difficulties in preschoolers as they are for other age groups or informants (e.g., Klasen et al., 2000). Alternatively, parents and teachers may have divergent views on these less turbulent aspects of children's maladjustment: they see children in separate contexts and/or their reference points differ (e.g., teachers are used to comparing many children). Lastly, the Prosocial Behavior subscale showed small-to-moderate negative associations with children's internalizing and externalizing problems, CBCL-DP, and emotion lability, and positive associations with emotion regulation and social preference, supporting the protective role of prosociality (Padilla-Walker et al., 2018).

The SDQ-DP 15-item showed small-to-moderate positive associations with the CBCL-DP, teacher- and parent-reported measures of lability/negativity, externalizing problems, and surgency; it was also moderately and negatively linked to teacher-reported positive emotion regulation skills, effortful control, and social preference. This supports the validity of the SDQ-DP 15-item and further highlights its association with negative outcomes (Deutz et al., 2018; Levantini et al., 2024). Nonetheless, it is important to highlight that the strongest correlations were between those measures rated by teachers, likely reflecting rater or method effects, as scales completed by the same informant tend to correlate more strongly. This should be taken into account when interpreting the results of the current study. Correlation analysis also revealed that the SDQ-DP 15-item was not linked to parent-reported internalizing problems. One possible explanation is that preschoolers may tend to manifest distress through externalizing behaviours (e.g., yelling, aggression) rather than internalizing ones, which require introspective and verbal skills not wholly developed at this age. Also, internalizing symptoms (e.g., worry, negative mood) might be less visible in young children, and, subsequently, underreported, weakening their association with the DP. Lastly, it is also possible that the DP measured with the SDQ is not sensitive enough to capture the internalizing factors of dysregulation in preschoolers.

Future studies should explore the longitudinal associations between the SDQ dimensions and children's outcomes and enroll larger samples to assess gender, age, and cultural differences. Further comparisons with parental points of view would also make an interesting contribution to evaluating children's strengths and difficulties.

Overall, the results of the current study, employing a multi-informant approach, yielded mixed results for the use of the Italian version of the SDQ and SDQ-DP with preschoolers. While they highlighted some problems with the factor structure – especially for the SDQ – most scales reported

appropriate reliability and homogeneity and expected associations with relevant variables. These patterns suggest that, despite limitations in structural validity, the SDQ and the SDQ-DP capture meaningful dimensions of children's behavioural and regulatory difficulties. Early detection is crucial, as behavioural/emotional problems, as well as dysregulation, can predict later difficulties in academic achievement, social relationships, and mental health (e.g., Caro-Cañizares et al., 2020; Levantini et al., 2021). Implementing reliable screening instruments can help educators and psychologists identify children who may benefit from targeted early interventions, potentially mitigating the exacerbation of difficulties.

### Disclosure statement

No potential conflict of interest was reported by the authors.

### Data availability

The data that support the findings of this study cannot be shared due to privacy and confidentiality restrictions.

### Declaration of generative AI

During the preparation of this work, the authors employed ChatGPT to assist with language editing. The authors subsequently reviewed and revised the text and take full responsibility for its content.

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