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Research

Evaluating the measurement invariance of the parenting practices scale in the Caribbean

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Abstract
The purpose of this study was to assess the factor structure and measurement invariance of the three-factor (nurturance, monitoring, discipline) 29-item Parenting Practices Scale across four Caribbean islands—Jamaica, St. Kitts and Nevis, The Bahamas, and St. Vincent and the Grenadines—with data from 1948 adolescent Caribbean grade 10 students. Exploratory factor analysis and confirmatory factor analysis were conducted, and the findings supported the original three-factor model, and factor loading invariance was found across the four Caribbean islands. These findings suggest that this parenting measure may be used to compare perceptions of parental behaviors among adolescents in the English-speaking Caribbean with some limitations that are discussed.

Keywords Adolescence · Construct validity · Measurement invariance · Parenting · Parenting practices scale

1 Introduction

Across cultures, parents are significant in the socialization of their children. According to Tamis-LeMonda et al. [1], a task of parenting shared across cultures is providing support to enable children to acquire the necessary adaptive skills to function in their communities. Parenting across cultures is dynamic, complex, and multifaceted and includes features such as relationships, negotiable and nonnegotiable rules, resources, and communication [2, 3]. Moreover, the roles of parents in socializing their children as they develop based on internal and external influences [4] are executed in several domains, such as authority (e.g., control and demandingness), attachment (e.g., security and protection), and intimacy (e.g., warmth and affiliation) (see [5]). Additionally, these domains have unique functions and power dynamics [6] due to parenting practices, parenting styles, and salient domains of socialization, which have similarities and differences across cultural contexts [7], including English-speaking Caribbean islands.

Nonetheless, parenting in minority and sociocultural contexts has been stigmatized for decades because research studies utilize a deficit model [8]. To address this gap in the literature, parenting should be assessed with measures that are sensitive to diverse cultural contexts. Thus, the present research study aimed to assess the factor structure, construct validity, and measurement invariance of the parenting practices scale (PPS), which has been used across four English-speaking Caribbean islands.

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The parent–child relationship influences children's developmental outcomes across cultural contexts [5]. This influence is embedded in cultural contexts that dictate norms, values, parenting approaches, and expectations of children's behaviors [9]. Additionally, mothers and fathers face unique and shared challenges and barriers to parenting in cultural contexts [10], which may be influenced by unique systemic influences [11]. Therefore, although parent–child relationships have universal functions, such as providing basic needs, safety, and security for the developing child, these relationships involve specific processes based on a culture's historical, economic, and social context [12]. For example, traditional parenting among African American families was labeled an authoritarian parenting style because of a deficit approach and a lack of cultural sensitivity but was later found to be similar to authoritative parenting in White American families [13]. Thus, parenting approaches within countries and societies are shaped by their respective cultures and must be studied with culturally appropriate measures.

1.1 Approaches to child socialization

Parents' approaches to child socialization encompass three broad categories: (a) parenting style, (b) parenting practices, and (c) domains of socialization. Parenting style refers to parents' thoughts, feelings, and actions concerning their children that are communicated to them, creating the emotional context of parenting behaviors [14]. The key dimensions of parenting styles are acceptance or responsiveness (i.e., supportiveness, warmth, closeness) and demandingness, discipline, or control (i.e., harshness and physical punishment) [15]. In the late 1940s, Baldwin [16] identified an authoritarian parenting style consisting of high demandingness and low responsiveness in the U.S. In the 1960s, Baumrind [17] documented other parenting styles, including authoritative parenting (both high responsiveness and demandingness) and permissive parenting (high responsiveness and low demandingness). Other researchers highlighted indulgent parenting (high responsiveness and low demandingness) and indifferent parenting (both low responsiveness and demandingness), which are associated with the most negative child outcomes [15]. Subsequently, Baumrind [18] included the rejecting-neglecting or disengaged parenting style, which is neither responsive nor demanding and is similar to indifferent parenting. Additionally, Baumrind [13] noted that the traditional parenting style (both high responsiveness and demandingness) in African American families was identical to authoritative parenting in White American families, resulting in similar positive outcomes for children.

Concerns regarding the limitations of parenting typologies have led to a debate about the usefulness of parenting style typologies [14]. For example, although Baumrind [18] recognized that the operational definitions of parenting typologies differ based on factors such as social context, method of assessment, and period of development, the definitions of parenting typologies based on North American children have been applied to non-North American families. More specifically, the focus on cultural values, beliefs, and practices, including collectivist ideologies, has been identified as problematic when applied to definitions of parenting styles among non-North American families. Consequently, Baumrind [13] offered traditional parenting as a corrective to a lack of cultural sensitivity to traditional families. In addition, Baumrind [18] affirmed that when parents are directive or traditional, they are not always authoritarian parents. Notably, parenting typologies focus on what parents do, which makes parenting style more related to the long-term effects of parents on their children [14]. Thus, there are many limitations to focusing on parenting styles across cultural contexts, and parenting practices may be more applicable in understanding how parents influence their children's daily lives.

Parenting practices such as behavioral and psychological control and affection refer to targeted behaviors of parents based on specific parenting goals [14]. According to the Multidimensional Assessment of Parenting Scale (MAPS), parenting practices involve proactive parenting, positive reinforcement, warmth, supportiveness, hostility, physical control, and lax control [19]. Notably, both positive and negative parenting practices have immediate impacts on children, as they are goal-directed behaviors used by parents in various contexts. However, parenting practices are more likely to facilitate desired outcomes when a combination of high acceptance and discipline guides parenting goals. Thus, approaches to socializing children should involve parenting practices and parenting styles [20], which are activated based on specific domain(s) of socialization.

Scholars have focused on parental socialization, which involves parenting behaviors such as discipline, monitoring, and nurturance. First, as an aspect of parenting practices, discipline has a negative connotation involving the expression of negative emotions, control, and hostility [21]. For example, disciplinary approaches such as harsh discipline [22] and physical punishment (see [23]) are regarded as maladaptive.

Second, parental monitoring involves several related parenting behaviors that parents use to give attention to their children and keep track of where they are, what they are doing, and how they adapt to situations and environments [24]. Other scholars have indicated that parental monitoring should also include the willingness of children to voluntarily

disclose information to parents as a feature of parental monitoring [25]. Taken together, parental monitoring has been associated with reducing deviant peers and delinquent behavior [26–29].

Finally, parental nurturance refers to expressing love and affection for children [30], which is essential for their well-being. For example, children may positively interpret the treatment they receive from their parents based on their parents' demonstrations of affection and fairness [21]. Additionally, there is a negative association between parental nurturance and aggressive behaviors, whereby increased nurturance is associated with reduced aggressive behaviors [21]. In sum, parental discipline, monitoring, and nurturance may be supportive factors for child development, but cultural contexts may be influential. Parents' thoughts may influence parenting practices in the context of parenting, as parents socialize their children.

More recently, scholars have turned their attention to exploring child socialization from a domain perspective. Grusec and Davidov [5] argued that there are five domains of socialization (protection, reciprocity, control, guided learning, and group participation), each characterized by the nature of the parent–child interaction, parental behavior, and the mechanism of socialization. First, parent–child interactions in the protection domain involve the parent as the provider of protection and the child as the recipient in which the parent seeks to alleviate the child's distress based on the socialization mechanism of the child's confidence in the parent's protection. Second, in the reciprocity domain, parent–child interactions are characterized by exchange or equality whereby the parent complies with requests from the child that are reasonable as well as with the attempts of the child to influence the relationship based on the mechanism of the human innate tendency to reciprocate. Third, in the control domain, the parent–child relationship is based on a hierarchical structure in which parents use methods of discipline best suited for their parenting goal(s) and influenced by the socialization mechanism of the acquisition of self-control. Fourth, the guided learning domain involves the parent serving as a teacher to their child as the student in which the parent seeks to match his or her teaching to his or her child's increasing level of understanding as the child grows and develops. This socialization domain is accomplished through the socialization mechanism of the child's internalization of language. Finally, the group participation domain involves the parent and child being members of the same social group and the parent enabling the child to both observe and participate in appropriate cultural practices. This is accomplished through the socialization mechanism of a firm sense of social identity. Taken together, the attention given to domains of socialization highlights that parental behaviors that are similar may influence socialization in more than one domain and that parents may not be successful in all domains [5]. Additionally, parents' perceptions of their own success or failure in parenting their children may be impacted by the challenges or barriers they encounter [10] and their use of religious resources [31].

Unsurprisingly, researchers have found that parental behaviors may influence children's behaviors to a greater or lesser extent in some contexts and cultures, and some domains of socialization may be more impactful in influencing specific behaviors in children in some cultures [32]. For example, Streit et al. [33] reported that for Mexican youth in the United States of America, maternal and paternal ethnic socialization were associated with different forms of prosocial behaviors. Moreover, both fathers' harsh discipline and acceptance were linked to specific prosocial behaviors. As such, culture and context may influence the domains of socialization, specific parenting behaviors, and child behaviors and outcomes. For example, Green and Chuang [31] reported that Jamaican mothers used religion in the socialization of their children, but how they incorporated religion in their parenting practices changed over time. Thus, parents may seek to achieve similar outcomes for their children based on the domain of socialization, but they utilize pathways based on the emphasis in their sociocultural contexts, which is also impacted by their own developmental stages.

1.2 Culture and child socialization

There is mounting evidence that culture influences the association between parenting and child outcomes. For example, in a meta-analysis, Pinquart and Kauser [34] concluded that authoritative parenting (i.e., high warmth and control) might be best. Nevertheless, authoritarian parenting (i.e., low warmth and high control) and, to a lesser extent, permissive parenting (i.e., high warmth and low control) may be functional in some cultural contexts. Similarly, in a study involving 24 countries, parents varied significantly in their responses to their children's behaviors and their endorsement of physical discipline. Additionally, researchers have found similarities and differences in parents' child emotion-related socialization behaviors in diverse cultures (see [35]).

There is a growing body of research on child-rearing practices in the Caribbean. The available literature has been primarily parent-centered, with attention given to the effects of disciplinary practices on children's developmental outcomes [36, 37]. Since the 1980s, studies have shown that assertive, active, curious, and independent children are regarded as troublesome [38], and for more than 50 years, research has shown that parents often utilize harsh discipline to achieve their intended outcomes for their children [2, 39]. However, studies on parenting practices overemphasize parental control, with inadequate

attention given to parental monitoring and nurturance. Additionally, a review of the literature suggested that the measures that researchers used to examine parental disciplinary strategies and adolescents' perceptions of their parents were developed and validated in other cultures with different historical and socioeconomic contexts. Consequently, the cultural appropriateness of instruments used to measure adolescents' perceptions of their parents' parenting strategies should be validated. Thus, the present study aimed to investigate whether cross-cultural generalizability exists for a parenting instrument that has been used among the population of four English-speaking Caribbean islands.

1.3 Importance of examining scale structures across sociocultural contexts

Testing factorial structure in diverse sociocultural contexts (cross-cultural generalizability) is necessary because of limited research on measurement invariance involving scales that investigate children's and adolescents' behavioral outcomes [40]. Specifically, there needs to be more research on measures among Caribbean adolescents, as most parenting measures and theories originate from North American and European cultural contexts [41]. Notably, using these instruments without testing measurement equivalence/invariance in other cultural contexts gives the impression that the theoretical assumptions from which these studies were created apply to Caribbean contexts. For example, parents in the Caribbean may have to navigate unique issues and challenges due to their geographical proximity to North America, which leads to the possibility of remote acculturation. According to Ferguson and Bornstein [42], remote acculturation is the direct and/or intermittent contact between geographically separate groups that influence each other because of factors such as proximity, tourism, music, trade, cable television. Thus, a scale may purport the measurement of a specific construct, but there may be variability across cultures, highlighting the importance of measurement equivalence/invariance to ensure usefulness across sociocultural contexts [43].

Cultural differences in parenting pose a challenge to using scales in cross-cultural studies developed in nonidentical cultural contexts. Specifically, dissimilar underlying theoretical constructs may exist for diverse cultural groups [43]. However, if the theoretical construct (factorial structure) has been measured in the same manner across cultural groups and replicated among these groups, there is confidence that the scale may be equivalent across the groups and is suitable for testing [43, 44]. Thus, once this is achieved, cross-cultural measurement equivalence/invariance is demonstrated across various cultural groups [43].

The establishment of cross-cultural generalizability of parenting scales is important for cross-cultural comparison [44], especially in the Caribbean, where there are differences in economic characteristics, demographic features, and the importance of social class across islands. Additionally, cross-cultural generalizability improves the comparisons of findings among various populations by accounting for bias, ensuring that the indicators of a construct are appropriate and relevant across groups [43]. This approach will support the utilization of findings from the scales to develop necessary research and interventions more confidently.

1.4 Current study

The current study has several aims. First, the researchers evaluated the original factor structure and construct validity of the PPS to determine whether it is equally valid and reliable across Caribbean adolescents in Jamaica, St. Kitts and Nevis, The Bahamas, and St. Vincent and the Grenadines. Second, we aimed to determine the best-fitting model to ascertain measurement equivalence/invariance to investigate whether adolescents from the four Caribbean islands quantitatively reported parenting behaviors in the same way.

The researchers expected that the PPS would comprise three dimensions: nurturance, monitoring, and discipline. Thus, a three-factor model was expected to show the best fit and significantly fit better than a two-dimensional parenting model. It was hypothesized that: (a) the conceptual structure of the PPS would demonstrate construct validity based on factor analysis and (b) the PPS would display measurement equivalence/invariance across the four Caribbean islands.

2 Method

2.1 Participants

The demographic characteristics are reported in Table 1. The participants were 1948 grade 10 students from four English-speaking Caribbean islands: Jamaica, The Bahamas, St. Kitts and Nevis, and St. Vincent and The Grenadines.

These islands have similar historical backgrounds as former British slave colonies and are now governed as independent nations. There were 278 Jamaican adolescents (M_{age} = 15; SD = 0.69), 217 Bahamian adolescents (M_{age} = 14.3; SD = 1.04), 737 St. Kitts and Nevis adolescents (M_{age} = 15.5; SD = 0.84), and 716 St. Vincent and The Grenadines adolescents (M_{age} = 15.5; SD = 1).

2.2 Material

Lempers et al.'s [45] Parenting Practices Scale (PPS) is one of the instruments used to assess parenting in the Caribbean. The PPS was developed with a sample of adolescents attending a private high school in a midwestern farming community in the United States of America [45]. The items for the scale were developed from Schafer's [46] Children's Report of Parental Behavior Inventory, The Child Rearing Practices Report [47], and items added by Lempers et al. [45]. The 29-item instrument measures adolescents' perceptions of how their parents (biological, stepparent, or foster parents) in general acted toward them based on their interactions in the last six months. The scale has three subscales, encompassing nurturance (positive evaluation, showing positive affect, and equal treatment with 14 items, e.g., "Give me a lot of care and attention" and "Reward me with extra privilege"), discipline (showing negative affect, control, and hostility with ten items; e.g., "Soon forget rule they have made" and "Hit me or threaten to do so"), and monitoring (direction and supervision of parents with five items, e.g., "Do tell me what time to be home" and "Provide supervision and check up on me").

Participants rated the items on a 4-point scale: a = never, b = sometimes, c = often, and d = very often. Cronbach's alphas for the 29 items were reported as 0.80 for the entire scale and from 0.76 to 0.81 for the subscales. Additionally, exploratory factor analysis (EFA) indicated that the scale had three factors related to nurturance, accounting for 25.52% of the variance; discipline, accounting for 10.82% of the variance; and monitoring, accounting for 6.38% of the variance. However, they excluded attention to monitoring from their study variables due to the low percentage of variance for which it accounted [45].

One Canadian study used the National Longitudinal Survey of Children and Youth (NLSCY) data collected by Statistics Canada to conduct a confirmatory factor analysis (CFA) with a modified version of the original PPS questionnaire by changing the wording of one item and excluding ten items (6 nurturance, 3 rejection, and 1 monitoring), making it a 19-item scale. Additionally, the response format was changed from a 4-point scale to a 5-point scale with 0 = never, 1 = rarely, 2 = sometimes, 3 = often, and 4 = always. EFA was conducted based on the 19 items, revealing three factors: nurturance (7 items; alpha = 0.77), rejection (7 items; alpha = 0.59), and monitoring (5 items; alpha = 0.54). Apart from nurturance, the alphas were lower than those reported for the 29 items, which ranged from 0.76 to 0.81. CFA, with six items for the nurturance subscale and four items for the monitoring subscale, provided support for a two-factor PPS scale [21]. However, the reported alpha was below the accepted level of 0.70 for the monitoring subscale [48].

Despite the noted weaknesses of the PPS factor structure, researchers have used the PPS both inside and outside of North America (see [49, 50]). For example, Lipps et al. [50] used the PPS to assess Caribbean adolescents' perceptions of their mothers' parenting practices. They found that Caribbean parents used a mixture of parenting styles. Authoritative

Table 1 Demographic features of the sampled adolescents

	Jamaica		Bahamas		St. Kitts		St. Vincent	
	N	%	N	%	N	%	N	%
Gender								
Male	115	41.4	90	41.5	371	50.3	384	53.6
Female	145	52.5	114	52.5	352	47.8	382	46.4
Missing	18	6.5	13	6	14	1.9	0	0
Age								
13	0	0	44	20.3	0	0	0	0
14	40	14.4	89	41	72	9.8	66	9.2
15	179	64.4	64	29.5	309	41.9	342	47.8
16	59	21.2	20	9.2	279	37.9	191	26.7
17	0	0	0	0	77	10.4	88	12.3
18	0	0	0	0	0	0	29	4.1

and neglectful parenting were the most reported parenting styles among families on the four Caribbean islands. Unfortunately, the instrument's factor structure has not been validated among Caribbean people and cultures. Therefore, there is uncertainty as to whether the instrument operates in the same way, representing the same underlying construct as the theoretical structure of the U.S. sample in which exploratory factor analysis supported two strong factors [45]. Alternatively, revisions might be needed similar to those made in a Canadian study based on confirmatory factor analysis [21]. Furthermore, Lempers et al. [45] combined the parenting styles of biological parents, stepparents, and foster parents, which is problematic [8]. Additionally, the measure should utilize a 5-point scale rather than a 4-point scale. Thus, the factor structure of the original 29-item questionnaire, which uses a Likert scale (7 ± 2) and assesses mothers and fathers as well as biological and social parents separately, would be useful [51].

Therefore, although the original instrument used a 4-point scale, it would be useful to use a more standard Likert-type scale. The rule of thumb for a Likert scale is 7 ± 2, which allows for a neutral point. Therefore, participants in the present study rated the items on a 5-point scale with 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very often.

2.3 Procedure

To recruit participants for the study, the researchers contacted the Ministries of Education on each island. The authors selected schools on the four islands to obtain consent for students to participate in the study and briefed them on its nature. The parents provided signed consent, and the participants provided assent. Students from all grade 10 classes in the chosen schools were sampled to participate in the study. The students completed a questionnaire during one of their regularly scheduled classes, including demographic information and the PPS. Completion of the measures took approximately 45 min. The University of the West Research Ethics Committee granted ethics approval for the study.

2.4 Statistical analyses

Confirmatory factor analysis. CFA was conducted using AMOS (analysis of moment structures) and maximum likelihood estimation to determine whether the Lempers et al. [45] 3-factor structure was supported in the Caribbean samples in the same way that it has been used by researchers. Model fit was evaluated using various fit indices, including x^2 and the ratio of x^2/df (a good model fit is considered to have a small x^2/df ratio that is less than 2.0) [52], the Tucker–Lewis Index (TLI; [53]), and the Comparative Fit Index (CFI; [54]). CFI and TLI values greater than 0.90 are within the range of adequate fit, with values of 0.95 preferable [55]. For the root mean square error of approximation (RMSEA), which represents the error variance per degree of freedom in the model, a value of 0.06 or less indicates a good fit [56], and a standardized root mean square residual (SRMR) < 0.05 to 0.08 is regarded as appropriate. The best-fitting model was developed with the St. Kitts and Nevis sample, as this sample included all the schools in Saint Christopher (St. Kitts) and Nevis, representing a near census of Grade 10 students.

2.5 Single-country solutions

After using the St. Kitts and Nevis sample to determine the best-fitting model, a single-island solution was generated for each of the remaining three island zones, producing a set of fit indices specific to each country. We used the same benchmark for the initial best fitting model to determine the degree of model fit. After we determined the same number of factors for the three countries, the next step was to examine measurement equivalence/invariance.

2.6 Measurement equivalence/invariance

Measurement invariance involves the extent to which each item on a scale operates similarly, as indicated by the model fit indices across different cultural groups [57]. A multiple group measurement equivalence/invariance test was conducted to determine whether the best fitting PPS model demonstrated measurement equivalence/invariance across the four Caribbean islands [58]. The first step was to conduct a configural invariance test, which examined the items that load onto the factors and the viability of the factor structure for each of the four islands. This helps determine whether the same number and pattern of latent factors (i.e., the dimensions) are present among adolescents on the four islands. We determined equivalence based on the delta chi-square test [i.e., the difference in the chi-square values (Δx^2) and the difference in degrees of freedom (Δdf)] of the baseline model and the consecutive models. Because the dataset is large and scholars have indicated that x^2 is very sensitive to unimportant small deviations, other indices were used to provide

further support [59]. Therefore, although a statistically significant x^2 is indicative that the constraints specified in the restrictive model do not hold (i.e., parenting dimensions are different across countries) and that the test for invariance is complete [60], other indices will be used to provide further support. Specifically, a ΔCFI value of − 0.01 and a ΔRMSEA of 0.01 support measurement invariance (see [61]).

The presence of configural invariance indicates that adolescents from the four islands used the same conceptual framework to evaluate parental behavior. If configural equivalence is confirmed for the PPS model, the second step, the metric invariance test, follows. The metric invariance test determines whether the factor loadings are equivalent across the four islands such that the factor loadings are equal while the observed variable intercepts are allowed to differ. A nonsignificant delta chi-square indicated support for invariance, as the model fit did not worsen. This means that the parenting dimensions in the scale are similar across the island participants.

3 Results

3.1 Exploratory factor analysis of the PPS

For the current study, the internal consistency reliability of the entire measure and the three subscales were acceptable (Cronbach's α = 0.78 for the overall measure and the subscales ranging from 0.71 to 0.91). To explore the factorial structure of the PPS in the Caribbean sample, all 29 items were subjected to EFA with varimax rotation. The Kaiser—Meyer—Olkin (KMO) measure was used to verify the sampling adequacy for the analysis, KMO = 0.93. Bartlett's test of sphericity x^2 (406) = 1979.57, $p < 0.001$, confirming that the correlation structure is amenable for factor analyses. Maximum likelihood (ML) factor analysis with a cutoff point of 0.40 and Kaiser's criterion of eigenvalues greater than 1 (see [62]) yielded a three-factor solution as the best fit for the data, accounting for 37.33% of the variance. The results of this EFA are presented in Table 2. These three factors are (a) nurturance, with 14 items and an eigenvalue of 7.39, accounting for 25.47% of the variance; (b) discipline, with ten items and an eigenvalue of 2.22, accounting for 7.67% of the variance; and (c) monitoring, with five items and an eigenvalue of 1.22, accounting for 4.19% of the variance. Importantly, the three factors obtained had the same structure as those found in the previous study [45], with one item (18) for the nurturance subscale and one item (19) for the monitoring subscale loading below 0.40. In contrast, for the previous study, discipline had one item (8) with a loading below 0.40, but in the current study, discipline had three different items with a loading below 0.40. Despite five factor loadings below 0.40 and the monitoring and discipline subscales accounting for a low percentage of variance, confirmatory factor analysis was performed.

3.2 Confirmatory factor analysis of the PPS

Table 3 displays the fit indices of the St. Kitts and Nevis sample for the CFA. The results of the CFA confirmed the previously obtained factor structure EFA. This model did not show adequate fit (CFI = 0.86, RMSEA = 0.063). Modification indices were examined to improve model fit for the best three-factor model and included removing the correlation between two of the latent variables (discipline and monitoring) because the correlation was not statistically significant. Additionally, some error terms were correlated: PQ10 ("Give me a lot of care and attention") and PQ12 ("Make their own life center around me"); PQ22 ("Speak of the good things I do") and PQ23 ("Seem proud of the things I do"); PQ26 ("Try to understand how I see things) and PQ28 ("Whenever we disagree we jointly solve the problem) on the nurturance factor; PQ1 ("Soon forget a rule they have made") and PQ2 ("Punish me for doing something one day but forget the next"); PQ5 ("Hit me or threaten to hit me") and PQ8 ("Have beaten me up") on the discipline factor; PQ15 ("What to know exactly where I am and what I'm doing) and PQ19 ("Provide supervision and check up on me") on the monitoring factor. These error terms were correlated based on test theory, which indicated that items measuring the same construct would be expected to share error variance and that CFA allows for control of their effects [63]. The errors for PQ13 ("Are interested in what I am learning at school") and PQ14 ("Take an interest in where I'm going") were correlated across the nurturing and monitoring factors. This is not unusual, as specific parenting behaviors can influence multiple domains of socialization [5]. After modification, the model had an adequate fit (CFI = 0.90, RMSEA = 0.054) compared to the initial model and an alternate two-factor model (see Table 3), $\Delta x^2(6) = 308.801$, $p < 0.001$ (see Fig. 1). Notably, the modified three-factor model was significantly better than a two-factor model that combined nurturance and discipline into one factor and kept monitoring as a single factor, $\Delta x^2(1) = 482.35$, $p < 0.001$. Focusing on the modified three-factor model, all standardized factor loadings

Table 2 Exploratory factory analysis of the items of the PPS

Items	Factor			Dimension
	1	2	3	
PQ23 Seem proud of the things I do	**0.814**	− 0.150	0.132	Nurturance
PQ22 Speak of the good things I do	**0.801**	− 0.145	0.070	
PQ24 Make sure I know I'm appreciated	**0.786**	− 0.155	0.115	
PQ25 Reward me with extra privileges	**0.699**	− 0.110	0.027	
PQ26 Try to understand how I see things	**0.680**	− 0.188	0.102	
PQ11 Listen to my ideas and opinions	**0.656**	− 0.214	0.098	
PQ20 Smile at me	**0.647**	− 0.120	0.184	
PQ21 Praise me	**0.634**	− 0.047	0.079	
PQ10 Give me a lot of care and attention	**0.596**	− 0.195	0.159	
PQ27 Give me the choice of what to do	**0.538**	− 0.146	− 0.016	
PQ12 Make their whole life center around me	**0.536**	− 0.113	0.139	
PQ 28 Whenever we disagree, we jointly solve the problem	**0.512**	-0.232	0.104	
PQ13 Are interested in what I'm learning at school	**0.507**	− 0.074	0.308	
PQ18 Let me go out any evening I want	0.229	− 0.002	− 0.273	
PQ7 Get angry and shout at me	− 0.228	**0.573**	0.113	Discipline
PQ5 Hit me or threaten to do so	− 0.219	**0.565**	0.127	
PQ4 Bother me about little things	− 0.157	**0.529**	0.076	
PQ6 Only keep rules when it suits them	− 0.127	**0.524**	0.014	
PQ9 Threaten punishment more often than use it	− 0.040	**0.466**	0.065	
PQ3 Enforce a rule depending on their mood	− 0.023	**0.430**	0.021	
PQ8 Have beaten me up	− 0.239	**0.423**	0.053	
PQ 29 When we argue we stay angry for a very long time	− 0.219	0.300	− 0.051	Monitoring
PQ1 Soon forget a rule they have made	0.000	0.275	− 0.184	
PQ2 Punish me for doing something one day but forget the next	0.103	0.231	− 0.106	
PQ15 Want to know exactly where I am and what I'm doing	0.178	0.033	**0.746**	
PQ14 Take an interest in where I'm going	0.254	0.018	**0.625**	
PQ17 Do tell me what time to be home	0.035	0.053	**0.580**	
PQ16 Do find out about my misbehaviors	0.134	0.052	**0.489**	
PQ19 Provide supervision and check up on me	0.293	0.014	0.384	

Extraction method, maximum likelihood; Rotation method, Varimax with Kaiser normalization. Loadings larger than 0.40 are bolded

Table 3 Fit of the confirmatory factor analytic model based on St. Kitts and Nevis Sample (N = 737)

Model	χ^2	df	χ^2/df	p	RMSEA [90% CI]	TLI	CFI	Difference from original 3-factor	
								$\Delta\chi^2$	Δdf
Original (N, D, M)	1460.79	374	3.91	< 0.001	0.063 [0.059, 0.066]	0.85	0.86		
Modified 3-factor (N, D, M)	1151.99	368	3.13	< 0.001	0.054 [0.050, 0.057]	0.89	0.90	308.80	6
Two-Factor (N & D, M)	1634.34	369	4.43	< 0.01	0.068 [0.065, 0.072]	0.80	0.84	482.35	1

N nurturance, *D* discipline, *M* monitoring, *RMSEA* root mean square error of approximation, *TLI* Tucker–Lewis index, *CFI* comparative fit index, *CI* confidence interval

were statistically significant ($p < 0.05$). Specifically, the loadings for the nurturance items ranged from 0.16 to 0.84 with average standardized factor loadings of 0.65 (Cronbach's $\alpha = 0.91$); the discipline items ranged from 0.12 to 0.69 with average standardized factor loadings of 0.44 (Cronbach's $\alpha = 0.71$); and the monitoring items ranged from 0.49 to 0.84 with average standardized factor loadings of 0.60 (Cronbach's $\alpha = 0.72$). The squared multiple correlations (SMCs) ranged from 0.014 to 0.71, with a mean SMC of 0.36, indicating that, on average, 36% of the variance in the observed variables

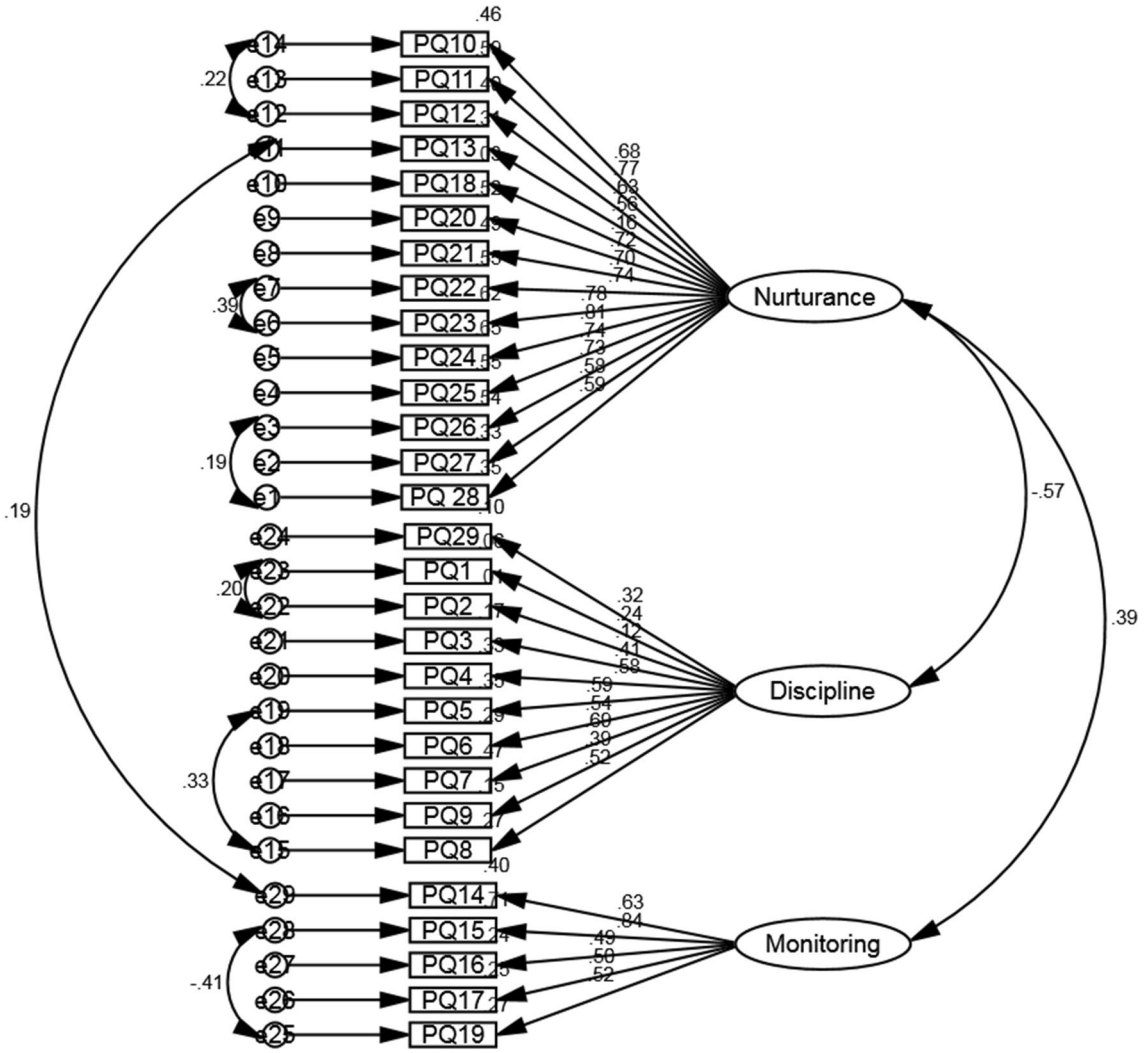

Fig. 1 Confirmatory factor analysis: three-factor model based on St. Kitts & Nevis sample

was accounted for by the latent factors. The discipline and monitoring factors were not significantly correlated, and the covariance between them was removed from further analysis.

3.3 Single-country solutions

The fit indices associated with the single-island solutions for the remaining three Caribbean islands are presented in Table 4. The results indicated that the modified three-factor model fit reasonably well for The Bahamas (e.g., RMSEA = 0.061), St. Vincent and The Grenadines (e.g., RMSEA = 0.062), and Jamaica (e.g., RMSEA = 0.062).

3.4 Measurement invariance

To determine whether the factor structure was the same for Jamaica, Bahamas, St. Kitts and Nevis, and St. Vincent and the Grenadines, a multigroup model was examined for configural measurement equivalence/invariance. The unconstrained results were $x^2 = 3841.69$, $df = 1472$, $\chi^2/df = 2.61$, TLI = 0.90, CFI = 0.88, NNFI = 0.87, RMSEA = 0.029, and SRMR = 0.061. The results for the metric invariance model constraining all factor loadings to be equivalent resulted in $x^2 = 3942$, $df = 1550$, $x^2/df = 2.54$, TLI = 0.90, CFI = 0.88, NNFI = 0.874, RMSEA = 0.028, and SRMR = 0.063.

Table 4 Fit statistics for the single-country confirmatory factor analysis three-factor model for Jamaica, The Bahamas and St. Vincent and the Grenadines

Country	χ^2	*df*	χ^2/df	RMSEA [90% CI]	TLI	CFI
Jamaica	754.656	368	2.051	0.062 [CI 0.055, 0.068]	0.81	0.83
Bahamas	662.477	368	1.80	0.061 [CI 0.053, 0.068]	0.90	0.90
St. Vincent & The Grenadines	1271.336	368	3.455	0.059 [CI 0.055, 0.062]	0.90	0.90

N nurturance, *D* discipline, *M* monitoring, *RMSEA* root mean square error of approximation, *TLI* Tucker–Lewis index, *CFI* comparative fit index, *CI* confidence interval

When the configural model was compared to this model, metric invariance was observed: $\Delta x^2 = 100.39$, $df = 78$, $p = 0.05$, ΔCFI = − 0.001, ΔNNFI = − 0.005, and ΔRMSEA = − 0.001. Next, scalar invariance was examined, in which the observed variable intercepts and factor loadings were constrained to be equal across groups: $x^2 = 4272.36$, $df = 1637$, $x^2/df = 2.61$, CFI = 0.867, NNFI = 0.87, RMSEA = 0.029, and SRMA = 0.063. Scalar invariance was not achieved $\Delta x^2 = 330.26$, $df = 87$, $p \leq 0.001$, ΔCFI = − 0.027, ΔNNFI = − 0.005, and ΔRMSEA = 0.001; therefore, no higher level of invariance was explored.

4 Discussion

This study examined the responses of 1,948 Grade 10 adolescents from four Caribbean islands—Jamaica, The Bahamas, St. Kitts and Nevis, and St. Vincent and the Grenadines—to investigate the factor structure, construct validity, and cross-cultural generalizability of the PPS [45]. Specifically, the hypotheses were as follows: (a) the conceptual structure of the PPS would demonstrate construct validity via factorial analysis, and (b) the PPS would show measurement equivalence/invariance across the four Caribbean islands. Previous studies have indicated that further research is needed to confirm the factor structure [45] and measurement equivalence/invariance [21] of the PPS. The demonstration of measurement equivalence/invariance is necessary for studies using the PPS to draw valid conclusions that the instrument measures the same theoretical constructs in different cultures. Additionally, measurement equivalence/invariance allows researchers to make cross-cultural comparisons of parenting. A lack of invariance would suggest that adolescents from the various islands would provide different perspectives on their parents' parenting practices.

The present CFA results provide some evidence for a multidimensional construct of parenting practices, suggesting a three-factor model that includes nurturance, monitoring, and discipline. Additionally, the CFA provided weak support for metric invariance.

4.1 Evidence of a three-factor model of the PPS

This study is the first to investigate the factor structure of a parenting instrument developed in North America and subsequently used in the Caribbean context as well as to conduct both an EFA and a CFA on the original 29-item PPS. The original latent structure of the PPS based on EFA [45] suggested three factors, with items conceptualized to assess nurturance, discipline, and monitoring. In contrast to the Canadian study, which dropped ten items and did not find support for one of the factors, discipline or rejection [21], the present study provided some support for all three factors involving the original 29 items. However, caution should be exercised because some factor loadings were below 0.20, and there were multiple highly correlated residual error terms. Importantly, the Canadian study did not find support for discipline. However, the current study provided strong evidence for nurturance and discipline, with weaker support for monitoring due to the low percentage of variance for which it accounted.

Similar to a previous study [45], the current study showed that the factor structures of nurturance and discipline were inversely related, indicating a moderate relationship. This finding suggested that problem behaviors may negatively affect parental nurturance, resulting in parents disciplining their adolescents.

There was a weak positive relationship between nurturing and monitoring. This finding may be related to the focus of the items on the parental monitoring scale. Although parental monitoring refers to parental knowledge of adolescents'

daily activities [27], the items focused on parents' efforts to strictly supervise their adolescents' behaviors and associations. Additionally, the current monitoring items are reported by the adolescent, asking them to report on how they perceive their parents' behaviors. Therefore, the subscale does not include parental knowledge generated from adolescents' willingness to disclose information [25]. As a result, adding more items to assess parental knowledge may strengthen this factor. Based on these findings, future use of the instrument should consider that the items do not comprehensively assess parental monitoring. Thus, it would be important for future researchers to distinguish whether they refer to parental monitoring or parental knowledge when using the scale.

Nonetheless, the positive association between nurturance and monitoring may be explained by adolescents' feelings that they matter. Feeling mattered is the tendency to psychologically regard the self as receiving respect or attention from special others [64]. Some of the participants were in early and middle adolescence, which means that they relied on parental support and parental monitoring. Therefore, these adolescents may perceive high levels of parental support and monitoring as expressions of care and concern. However, in later adolescence, adolescents may regard parental monitoring as an invasion of their private domain, as parental knowledge is negatively associated with delinquency, especially in later adolescence [65].

The findings suggest that discipline and parental monitoring should be differentiated among Caribbean adolescents because these factors are not significantly related. In the previous literature, monitoring implies a certain level of parental control, such as parental discipline, which aims to control adolescents' behaviors [25]. This similarity suggests that at least a moderate association might be present. The findings indicate that Caribbean adolescents may perceive a difference between monitoring and disciplinary practices. This may also be related to the items in the monitoring construct, as previously mentioned, as well as asking adolescents to comment about their parents' behaviors while they are responding to how much information they reveal to their parents. More research is needed to better understand how Caribbean adolescents view these two constructs.

4.2 Evidence for invariance among the islands

The results provided support for configural invariance, suggesting that adolescents in the four Caribbean islands similarly reported parenting constructs. With the additional confirmation of weak metric, the findings suggest that the relationships among the three dimensions seem to be equally strong among the islands. Thus, the test of island invariance suggested that the model fit well across the Caribbean islands, but caution needs to be taken when making mean comparisons. Overall, the results imply that researchers desiring to use the PPS to investigate and compare adolescents' perceptions of parenting can do so within a Caribbean cultural context with the use of the PPS, but caution is warranted, as the measure needs further development. Additionally, care must be taken to avoid connecting discipline and monitoring by exploring these relationships as a part of the research design or analysis.

4.3 Limitations and conclusion

Although this study contributes to a better understanding of the use of the PPS with Caribbean adolescents, there are several limitations. First, the data on parenting practices were collected at only one time point, limiting the capacity to assess the measurement equivalence/invariance of the PPS over time. Second, whereas the current sample is an impressive start, adolescents from only four of the seventeen English-speaking commonwealth nations and British Overseas Territories are included. Additional demographic characteristics would be helpful to gain a better understanding of the diversity of the sample. Despite the similarities between these seventeen countries based on the historical background of British colonial rule, the results may have been different if the sample of English-speaking islands had been more diverse.

The findings illustrated that researchers may use the three factors of the PPS to investigate Caribbean adolescents (ranging in years from 12 to 18) regarding their perceptions of parental behaviors in similar Caribbean contexts. Additionally, the present study highlights that researchers should ensure that empirical investigations using instruments constructed in different cultural contexts are culturally relevant and appropriate for the population of interest. One way to ensure this is to encourage scholars to implement measurement equivalence/invariance and factor structure tests on measurement instruments before utilizing scales in specific research environments. This approach ensures that the results of empirical investigations are meaningful and culturally appropriate for the population of interest.

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Author contributions D.S.G.: drafted some of the work or revised it critically for important intellectual content; performed the data analysis and reviewed the analysis for accuracy. Also, guided the review and revision process. T.B.: drafted most of the work, revised it critically for important intellectual content, and performed the data analysis. S.B.M.: guided the statistical analysis and reviewed the manuscript for accuracy and integrity. Performed analyses to confirm results in the revision process. G.L.: made substantial contributions to the conception or design of the work; read and provided feedback on the manuscript; and guided the data collection process.

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Data availability Data may be requested upon contacting the corresponding author.

Code availability Information may be requested by contacting the corresponding author.

Declarations

Competing interests There are no competing interests.

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