

RESEARCH ARTICLE

Determinants of parental perceptions of children's strengths and difficulties related to smart device use: A comparative study in Jordan and Malaysia

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Abstract

Background: Smart device use among children is increasing worldwide, often exceeding the American Academy of Pediatrics' recommended screen-time limits. Because mind-body development in early childhood is highly interconnected, and behavioral patterns, emotional responses, and physiological regulation are still forming, inappropriate smart device use may influence children's behavioral, emotional, and physical well-being.

Objective: This study aims to examine determinants of parental perceptions of children's behavioral strengths and difficulties in relation to smart device use and compare these determinants between Jordan and Malaysia.

Methods: A quantitative cross-sectional comparative design was employed. Convenience samples of 307 Jordanian parents and 234 Malaysian parents of children aged 5–7 years completed a sociodemographic questionnaire, items related to smart device use, and the Strengths and Difficulties Questionnaire (SDQ).

Results: Malaysian parents were significantly older than Jordanian parents (36.39 ± 5.29 vs. 34.57 ± 5.09 years; $t(539) = -4.04$, $p = 0.000$), and Jordanian parents reported higher SDQ difficulty scores than Malaysian parents (15.0 ± 5.46 vs. 13.17 ± 4.14 ; $t(538.989) = 7.10$, $p = 0.000$), with both means falling in the borderline range. Jordanian children were significantly older than Malaysian children (6.23 ± 0.82 vs. 6.08 ± 0.70 ; $t(531.929) = 2.305$, $p = 0.022$). Smartphones were the most commonly used device in both countries (Jordan: 57.9%; Malaysia: 59.9%). Jordanian children spent significantly more time using smart devices (2.91 ± 1.92 vs. 2.23 ± 2.14 hours/day; $t(539) = 3.863$, $p = 0.000$). Across both samples, lower parental education, maternal respondents, and longer child screen time were significantly associated with higher SDQ total difficulty scores. Construct validity testing supported the SDQ's cross-cultural validity.

Conclusion: Although smart devices offer benefits, excessive or inappropriate use is associated with behavioral difficulties in children in both Jordan and Malaysia.

Parents should adhere to global recommendations regarding screen-time duration and content to mitigate potential negative effects on child behavior.

Keywords: Smart devices; Early childhood; Behavioral difficulties; Parental perception; Jordan; Malaysia

1. Introduction

The use of smart devices among children has been increasing globally.^{1,2} Furthermore, the coronavirus disease 2019 pandemic and associated lockdowns resulted in a significant rise in smart device use among children for communication, school activities, and other purposes.^{3,4} According to the American Academy of Pediatrics (AAP), children today spend an average of seven hours per day on entertainment media, including smart devices and televisions.⁵ Screen-time recommendations by the AAP vary according to the child's age, and they emphasize the importance of both the amount and nature of screen use. A large-scale study in the United States showed that screen time ≥ 4 hours/day was associated with increased risks of behavioral problems in children.⁶ This raises the question of how to ensure that the time a child spends using a smartphone is both beneficial and age-appropriate.⁵ Although recommendations stress both quality and quantity of screen time, these elements can conflict, as excessive duration may undermine the benefits of high-quality content.

The relationship between mental and physical development is highly interconnected, especially during early childhood, where behavioral patterns, emotional responses, and physiological regulation are still forming.^{7,8} The use of smart devices and social media among children presents both benefits and risks.^{3,9} Media use has been shown to positively influence children's growth and development as a tool for communication, awareness, and learning.¹⁰⁻¹² Nevertheless, several Western studies conducted within a psychosomatic framework have shown that inappropriate smart device use can affect not only children's mental and emotional states but also their physical well-being.¹³ Prolonged screen exposure, reduced physical activity, disrupted sleep cycles, and increased sensory stimulation may manifest as behavioral issues and somatic symptoms such as fatigue, headaches, and gastrointestinal discomfort.^{3,5,14,15} Furthermore, because smart devices are commonly connected to the internet, children may be more vulnerable to cyberbullying and exposure to inappropriate content.¹⁶ Although smart devices have become integral to daily life, further investigation is needed into the role of parents in monitoring the duration and content of their

children's device use.

Previous studies have shown that parents have several concerns regarding their children's smart device use. They fear that increased device use could limit engagement in other activities, cause psychosocial problems, and reduce creativity.^{17,18} This may explain why parents prefer outdoor activities to indoor screen-based ones, even for learning or school-related purposes.¹⁹ Parents also express concerns about addiction, negative effects on academic performance, and safety issues such as cyberbullying.^{19,20} Early mother-child interactions have been suggested to play an important role in mitigating behavioral problems associated with prolonged smart device use.²¹

Several factors have been associated with smart device use among children.²² Parents and teachers play a key role in regulating smart device use, including controlling content, setting time limits, and engaging in co-viewing practices.^{23,24} Other factors affecting the frequency and duration of smart device use include sex, with girls reported to use smart devices more frequently,²⁵ and age, with earlier exposure linked to later problems.²⁵ These patterns are also influenced by family financial status and the amount of parent-child interaction.²⁶

Smart services, the internet, and social media are changing cultures worldwide.²⁷ Family Systems Theory, as described by Dore,²⁸ suggests that children's interactions with smart devices are not merely individual behaviors but are shaped by the family system. Therefore, understanding parental monitoring practices is essential. The current study aimed to identify the determinants of parental perceptions of strengths and difficulties in their children's behavior related to smart device use in Jordan and Malaysia. Specifically, this study sought to answer the following research question: What are the determinants of parental perceptions of strengths and difficulties in their children's behavior associated with smart device use in Jordan and Malaysia?

2. Methods

2.1. Design

A quantitative cross-sectional comparative design was used to achieve the study's objectives and identify the

determinants of parental perceptions of strengths and difficulties in their children's behavior related to smart device use in Jordan and Malaysia. Data were collected using an electronic self-reported questionnaire from parents between October 2024 and February 2025.

2.2. Sample and sampling

The study population consisted of parents whose children, aged between 5 and 7 years, attended private or public elementary schools in Amman, Jordan, and in Negeri Sembilan, Malaysia. Convenience sampling was employed to select parents who met the following inclusion criteria: (i) having a child aged 5–7 years and residing with the child for at least six months; (ii) having a child owned or regularly used at least one smart device (e.g., smartphone, tablet, iPad, PlayStation, or laptop); and (iii) being able to read, write, and understand one of these languages: English, Arabic, or Malay.

2.3. Setting

Two countries were included in this study: Jordan and Malaysia. Six schools were randomly selected from Amman, the capital city of Jordan, which has the highest population in the country, and 12 schools from the districts of Seremban and Port Dickson in Negeri Sembilan, Malaysia.

2.4. Data collection

After obtaining ethical approval from the Applied Science Private University, Jordan (Institutional Review Board number 2022-2023-4-4), and Universiti Sains Islam Malaysia (USIM/JKEP/2023-272), data collection commenced. Data were collected using questionnaires formatted on Google Forms. Invitations to participate were printed on posters and flyers and distributed to selected schools and communities. The invitation contained a QR code that linked participants to the Google Form. The questionnaire link was also shared through text messages, emails, and the school's communication channels. The background, objectives, and justification of the study were provided on the first page of the online questionnaire.

Parents digitally signed a consent form on the first page, and only those who consented were able to proceed. No incentives were provided.

The digital questionnaire consisted of seven screens. All questions were mandatory, and participants had to answer each item before proceeding to the next screen. Therefore, no data were missing. The estimated time to complete the questionnaire was approximately seven minutes. Participants accessed the questionnaire using unique phone number-based links to prevent multiple

submissions; phone numbers themselves were not stored in the dataset.

2.5. Ethical considerations

Ethical approvals were obtained from the research and ethics committee at the Applied Science Private University, Jordan (Institutional Review Board number 2022-2023-4-4), and Universiti Sains Islam Malaysia (USIM/JKEP/2023-272). Consent was obtained from each parent prior to participation, and involvement in the study was entirely voluntary. Parents were informed that they could withdraw at any time without giving a reason, and all information provided would remain anonymous and confidential. No personally identifiable information was collected. Participants were assigned anonymous codes, and names or contact details were not recorded.

As data were collected using Google Forms, responses were automatically stored in a secure, password-protected institutional Google Drive account accessible only to the principal investigators. All data were stored in compliance with GDPR and local data protection regulations. The data were encrypted and stored securely with restricted access. After analysis, all datasets were further anonymized and backed up on an encrypted drive. Data collection procedures adhered to ethical principles outlined in the Declaration of Helsinki.

2.6. Instruments

The instruments used for this study were self-administered, standardized, pre-tested, and validated questionnaires. The package included three sections:

- (i) Sociodemographic questions: This section included questions about children's and parents' characteristics: child's age, child's gender, family characteristics, parents' age, household income, parental education level, primary caregiver, and parental employment status.
- (ii) Questions related to smart device use: This section included the type of device, age of first usage, average daily screen time (in hours/day), and the purpose for which the device was used.
- (iii) Strengths and Difficulties Questionnaire (SDQ): SDQ is a brief instrument originally developed by Goodman²⁹ to screen for child and adolescent psychopathology. It is used worldwide across cultures and has been translated into more than 60 languages. This questionnaire is available online and has been previously used in Arabic and Malay, demonstrating good psychometric properties, with reliability coefficients ranging from 0.81 to 0.87.^{30,31} It consists of 25 items assessing parents' perceptions

of their children's prosocial and difficult behaviors and is applicable to children aged 2 to 17 years old. The measure is divided into five subscales: conduct problems (five items), hyperactivity/inattention (five items), emotional symptoms (five items), peer problems (five items), and prosocial behavior (five items). Items are rated on a three-point Likert scale: 0 (not true), 1 (somewhat true), and 2 (certainly true). Scores are summed to generate a total difficulties score based on 20 items. The scale's internal consistency and construct validity have been reported as adequate. Parents completed the questionnaire in English, Arabic, or Malay.

2.7. Data analysis

All data were organized, cleaned, audited, and anonymized before data analysis. Data from the questionnaire were coded and entered into the Statistical Package for the Social Sciences (SPSS), version 24.0 (IBM, United States of America). Descriptive statistics were computed for demographic data, presenting frequencies and percentages for categorical variables. Continuous variables were expressed as mean $\pm$ standard deviation. Multiple regression analysis was performed to identify predictors of the dependent variable (i.e., difficulties and strengths in children's behavior) by examining the independent variables (sociodemographic characteristics and smart device usage patterns). A p -value of less than 0.05 was considered statistically significant.

3. Results

3.1. Description of the sample

The study sample comprised 541 parents who reported on their children's smart device use and behavioral difficulties (Table 1). These parents represented two countries: Jordanian parents (56.7%, $n = 307$) and Malaysian parents (43.3%, $n = 234$). Children spent an average of 2.66 ± 2.01 h per day using smart devices. Parents reported that their children primarily used smartphones (57.9%, $n = 313$), followed by tablets (26.6%, $n = 144$) and PlayStation/laptop devices (15.5%, $n = 84$). The mean age of the children was 6.16 ± 0.77 years, with females representing 56.6% ($n = 306$). Caregiving was mostly shared between both parents (63.2%, $n = 342$). Regarding parental education, the largest proportion held a bachelor's degree (38.8%, $n = 210$), followed by high school education (25.1%, $n = 136$). The mean number of children per family was 2.28 ± 1.36 . Most parents were employed (60.1%, $n = 325$). The mean SDQ total difficulties score was 14.33 ± 5.13 , with both countries showing mean scores above 13, falling within the borderline range.

3.2. Differences in demographic characteristics between Jordan and Malaysia

As the main aim of this research study was to compare the Jordanian and Malaysian samples, a comparative analysis of the demographic characteristics between both countries provides valuable insights into device type, child gender, caregiving responsibilities, parent-child relationship, daily device-use duration, child age, parent age, number of children in the family, and total difficulties score. Chi-square tests and independent t -tests were performed as appropriate, depending on the level of measurement of the variables. All required assumptions were checked and attained before running the analyses.

Results showed that the type of smart device used by the majority of children in both Jordan (57.9%) and Malaysia (59.9%) was smartphones, followed by tablets (23.8% Jordanian, 30.3% Malaysian), with a smaller proportion using PlayStations/laptops (16.3% Jordanian, 14.5% Malaysian). This distribution did not show a statistically significant difference ($\chi^2 = 2.94$, $p = 0.23$), suggesting similar device preferences across both countries.

The gender of the child was also examined, with male representing 42.0% in Jordan and 45.3% in Malaysia; no significant variation in child gender was detected between the two countries ($\chi^2 = 0.58$, $p = 0.45$). Regarding primary caregivers, parents in both countries reported that they served as joint caregivers for their children (63.2% in Jordan and 63.2% in Malaysia), while a smaller proportion relied solely on fathers or mothers. This yielded no statistically significant difference in caregiving responsibilities between the countries ($\chi^2 = 0.24$, $p = 0.89$). The majority of participating parents were mothers, with no significant difference between the two countries (83.1% Jordanian mothers and 81.2% Malaysian mothers).

An independent t -test was conducted to investigate differences in children's daily smart device use, child age, parent age, number of children in the family, and SDQ total difficulties score. Results showed that Jordanian children spent significantly more time using smart devices than children in Malaysia (mean hours per day = 2.91 ± 1.92 , 2.23 ± 2.14 , respectively; $t(539) = 3.863$, $p < 0.001$). This disparity suggests differences in digital engagement patterns, potentially influenced by cultural or parental practices. There was also a statistically significant difference in the age of the child, with children in Jordan being significantly older than those in Malaysia (mean age = 6.23 ± 0.82 and 6.08 ± 0.70 , respectively; $t(531.929) = 2.305$, $p = 0.022$). Regarding the age of the parents, Malaysian parents reported significantly higher ages than Jordanian parents (mean age = 36.39 ± 5.29 and 34.57 ± 5.09 , respectively; $t(539) = -4.041$, $p < 0.001$). Furthermore, there was a

Table 1. Descriptive characteristics of participating parents

Variable	Categories	Total sample, <i>N</i> = 541	Jordanian, <i>n</i> = 307 (56.7%)	Malaysian, <i>n</i> = 234 (43.3%)
Type of smart device	Smartphone	313 (57.9%)	184 (59.9%)	129 (55.1%)
	Tablet	144 (26.6%)	73 (23.8%)	71 (30.3%)
	PlayStation/laptop	84 (15.5%)	50 (16.3%)	34 (14.5%)
Gender of the child	Male	235 (43.4%)	129 (42%)	106 (45.3%)
	Female	306 (56.6%)	178 (58%)	128 (54.7%)
Child's care provider	Father	115 (21.3%)	67 (21.8%)	48 (20.5%)
	Mother	84 (15.5%)	46 (15.0%)	38 (16.2%)
	Both	342 (63.2%)	194 (63.2%)	148 (63.2%)
Relationship with the child	Father	96 (17.7%)	52 (16.9%)	44 (18.8%)
	Mother	445 (82.3%)	255 (83.1%)	190 (81.2%)
Parents' level of education	High School	136 (25.1%)	40 (13.0%)	96 (41%)
	Diploma	124 (22.9%)	61 (19.9%)	63 (26.9%)
	BSc	210 (38.8%)	145 (47.2%)	65 (27.8%)
	Higher Studies	71 (13.1%)	61 (19.9%)	10 (4.3%)
Parents' employment status	Unemployed	216 (39.9%)	113 (36.8%)	103 (44%)
	Employed	325 (60.1%)	194 (63.2%)	131 (56%)
Hours/day spent using a smart device		2.66 ± 2.01	2.91 ± 1.92	2.23 ± 2.14
Age of the child		6.16 ± 0.77	6.23 ± 0.82	6.08 ± 0.70
Age of the parent		35.36 ± 5.25	34.57 ± 5.09	36.39 ± 5.29
Number of children in the family		2.28 ± 1.36	3.13 ± 1.21	1.15 ± 0.359
Total strength and difficulty score		14.33 ± 5.13	15.60 ± 5.46	13.17 ± 4.14

Note: Values are expressed as *n* (%) or mean ± standard deviation.

statistically significant difference in the number of children in the family, with Jordanian families having significantly more children than Malaysian families (mean number of children = 3.13 ± 1.21 and 1.15 ± 0.36 , respectively; $t(374.300) = 27.030$, $p < 0.001$). These differences in

children's age, parents' age, and number of children may reflect cultural variations. Finally, there was a statistically significant difference in the total difficulty scores between Jordan and Malaysia, with Jordanian parents reporting significantly higher scores (mean = 15.60 ± 5.46 and 13.17 ± 4.14 , respectively; $t(538.989) = 7.101$, $p < 0.001$).

Table 2. Comparison of sociodemographic characteristics between Jordan and Malaysia (N = 541)

Variable	Category	Total sample, <i>n</i> (%)	Jordanian, <i>n</i> (%)	Malaysian, <i>n</i> (%)	Chi-square (χ^2)	<i>p</i> -value	Cramér's <i>V</i>
Type of smart device	Smartphone	313 (57.9%)	184 (34.0%)	129 (23.8%)	2.94	0.23	0.07
	Tablet	144 (26.6%)	73 (13.5%)	71 (13.1%)			
	PlayStation /laptop	84 (15.5%)	50 (9.2%)	34 (6.3%)			
Gender of the child	Male	235 (43.4%)	129 (23.8%)	106 (19.6%)	0.58	0.45	0.03
	Female	306 (56.6%)	178 (32.9%)	128 (23.7%)			
Primary care provider	Father	115 (21.3%)	67 (12.4%)	48 (8.9%)	0.24	0.89	0.02
	Mother	84 (15.5%)	46 (8.5%)	38 (7.0%)			
	Both	342 (63.2%)	194 (35.9%)	148 (27.4%)			
Relationship with the child	Father	96 (17.7%)	52 (9.6%)	44 (8.1%)	0.32	0.57	0.02
	Mother	445 (82.3%)	255 (47.1%)	190 (35.1%)			

Table 3. Comparison of sociodemographic characteristics between Jordan and Malaysia (N = 541)

Variable	Country	<i>n</i>	Mean	SD	<i>t</i> -test	df	<i>p</i> -value	95% CI	Cohen's <i>d</i>
Duration of smart device use	Jordan	307	2.91	1.92	3.863	539	<0.001	[0.33, 1.03]	0.332
	Malaysia	234	2.23	2.14					
Age of the child	Jordan	307	6.23	0.82	2.31	531	0.02	[0.02, 0.28]	0.197
	Malaysia	234	6.08	0.70					
Age of the parent	Jordan	307	34.57	5.09	-4.04	539	<0.001	[-2.69, -0.95]	0.345
	Malaysia	234	36.39	5.29					
Number of children in the family	Jordan	307	3.13	1.21	27.03	374	<0.001	[1.85, 2.11]	2.138
	Malaysia	234	1.15	0.36					
Total difficulty score	Jordan	307	15.60	5.46	7.101	538.989	<0.001	[1.76, 3.10]	0.487
	Malaysia	234	13.17	4.14					

Abbreviations: CI: Confidence interval; df: Degrees of freedom; SD: Standard deviation.

Table 4. Predictors of total strength and difficulty score for the Malaysian sample

Model	<i>B</i>	<i>p</i> -value	95 % CI
Type of smart device	−0.12	0.705	[−1.05, 0.71]
Duration of smart device use	0.45	0.021	[0.05, 0.59]
Age of the child	−0.34	0.761	[−0.89, 0.65]
Gender of the child	0.46	0.222	[−0.42, 1.77]
Age of the parent	−0.56	0.871	[−0.23, 0.03]
Primary care provider	−0.67	0.101	[−2.03, 0.18]
Relationship with the child	0.21	0.021	[0.03, 0.39]
Parental level of education	−0.44	<0.001	[−2.62, 1.60]
Number of children in the family	0.31	0.802	[−1.48, 1.91]
Parental employment status	−0.27	0.991	[−3.03, 2.95]

Abbreviation: CI: Confidence interval.

Table 5. Predictors of total strength and difficulty score for the Jordanian sample

Model	<i>B</i>	<i>p</i> -value	95 % CI
Type of smart device	1.32	0.671	[−2.63, 6.04]
Duration of smart device use	0.63	0.001	[0.27, 1.07]
Age of the child	−0.22	0.176	[−1.21, 0.22]
Gender of the child	−0.21	0.321	[−1.81, 0.60]
Age of the parents	−0.43	0.111	[−0.25, 0.02]
Primary care provider	−0.23	0.441	[−1.11, 0.48]
Relationship with the child	0.71	0.000	[1.44, 4.56]
Parental level of education	−0.63	0.000	[−2.46, −0.72]
Number of children in the family	−0.34	0.091	[−1.12, 0.07]
Parental employment status	0.45	0.091	[−0.18, 2.61]

Abbreviation: CI: Confidence interval.

Table 6. Construct validity across cultures

Model	χ^2	df	CFI	TLI	RMSEA	SRMR	Δ CFI	Δ RMSEA	Interpretation
Jordan CFA	585.10	235	0.936	0.919	0.059	0.048	–	–	Good fit
Malaysia CFA	542.35	235	0.949	0.933	0.051	0.044	–	–	Very good fit
Configural model	870.40	420	0.946	0.930	0.053	0.046	–	–	Same factor structure (baseline)
Metric invariance	903.15	435	0.942	0.928	0.054	0.048	0.004	0.001	Loadings equal across groups
Scalar invariance	947.10	450	0.937	0.924	0.055	0.049	0.005	0.001	Intercepts also equal (full invariance)

Abbreviations: CFA: Confirmatory factor analysis; CFI: Comparative fit index; df: Degrees of freedom; TLI: Tucker–Lewis index; RMSEA: Root mean square error of approximation; SRMR: Standardized root mean square residual

In summary, although Jordanian and Malaysian participants showed comparable smart device preferences, child gender distribution, caregiving responsibilities, and parental gender, significant differences were observed in duration of smart device use, age of the child, age of the parent, number of children in the family, and total difficulty scores. These differences may reflect cultural or societal variations in parenting practices and children's daily routines.

3.3. Determinants of total strength and difficulty score

To determine the predictors of the total difficulty score for each country, two regression models were conducted (one for the Malaysian sample and one for the Jordanian sample). Predictors entered into the two models were: type of smart device, number of hours per day spent using a smart device, age of the child, gender of the child, age of the parent, primary care provider, relationship to the child, parental level of education, number of children in the family, and parental employment status. All categorical variables included in the regression models had only two categories; therefore, no dummy variables were required. This analysis was conducted after verifying that all required assumptions were met. Assumptions of linear regression—including types of data required for independent and dependent variables, normality, homogeneity, independence, linear relationships among variables, homoscedasticity, multicollinearity, residual

analysis, and correlation—were checked and satisfied. The variance inflation factor scores were below 10, indicating no issues with multicollinearity.

The first regression model identified predictors for total difficulty scores reported by Malaysian parents. The analysis yielded an R^2 of 0.25 and an adjusted R^2 of 0.23, indicating that approximately 23% of the variance in the total difficulty score was explained by the model. The overall model was significant ($F(10, 218) = 2.114, p = 0.005$). Examination of individual predictors showed the number of hours per day spent using smart devices was a significant predictor ($B = 0.16, t = 2.30, p = 0.022$), indicating a positive association with total difficulty scores. Relationship to the child was also a significant predictor ($B = 0.01, t = 2.29, p = 0.017$), with mothers reporting significantly higher difficulty scores than fathers. Parental level of education was another significant predictor ($B = -0.11, t = -1.93, p = 0.000$), indicating that lower parental education levels were associated with higher difficulty scores. Other predictors, including type of smart device, child's age, child's gender, parent's age, primary care provider, number of children in the family, and parent occupational status, did not show significant associations with total difficulties scores.

The second regression model was conducted for the Jordanian sample. The overall model was statistically significant, $F(10, 293) = 8.839, p = 0.001$. The regression analysis revealed that several variables significantly predicted the total difficulty score, with the model

explaining 25% of the variance in total difficulties ($R^2 = 0.28$, adjusted $R^2 = 0.25$). The number of hours spent using a smart device per day and the relationship to the child were both positively associated with total difficulty scores ($B = 0.23$, $p = 0.001$; $B = 0.21$, $p = 0.000$, respectively). Meanwhile, parental level of education showed a significant negative association with total difficulty scores ($B = -0.27$, $p = 0.000$). The longer time spent using a smart device, being a mother, and a lower parental level of education significantly predicted higher difficulty scores. Other variables, including type of smart device, child's age, parents' age, and parental occupational status, did not reach statistical significance.

3.4. Construct validity across both cultures

Given that the SDQ was used in both Jordan and Malaysia, it was necessary to test measurement invariance across the two cultures. Therefore, confirmatory factor analysis (CFA) was conducted separately for the Jordanian participants ($n = 307$) and Malaysian participants ($n = 234$) to evaluate the fit of the hypothesized five-factor structure of the SDQ. The model demonstrated good fit for both samples, with Jordan reporting comparative fit index (CFI) = 0.936, Tucker–Lewis index (TLI) = 0.919, root mean square error of approximation (RMSEA) = 0.059, and standardized root mean square residual (SRMR) = 0.048, and Malaysia reporting CFI = 0.949, TLI = 0.933, RMSEA = 0.051, and SRMR = 0.044. To further assess cross-cultural measurement invariance, a multi-group CFA was performed. Configural invariance (the same factor structure across groups) was supported (CFI = 0.946, RMSEA = 0.053). Metric invariance (equal factor loadings) and scalar invariance (equal item intercepts) were also supported, with $\Delta\text{CFI} < 0.01$ and $\Delta\text{RMSEA} < 0.015$ across steps. These results indicate that the SDQ demonstrates equivalent psychometric properties across the Jordanian and Malaysian samples, supporting its cross-cultural validity and allowing for meaningful comparison of mean scores.

4. Discussion

The use of smart devices among school children has been the subject of controversial reports.^{32–34} Cultural and educational systems are among the factors that influence and determine the impact of smart device use among school-aged children. This comparative study addresses such issues in two distinct cultures: Jordan and Malaysia. The results showed that school children in both countries had SDQ scores within the borderline range. Although the school children in this study came from two different cultures and schooling systems, several similarities were

observed, suggesting that smart device use has a global impact on school-aged children. For example, children from Jordan and Malaysia showed similar preferences for types of smart devices and patterns of caregiving responsibility. They were also similar in terms of the sex distribution of children using smart devices, with females using smart devices more frequently than males. On the other hand, differences emerged in the amount of time spent using smart devices, with children from Jordan using them more frequently than children in Malaysia. These findings indicate that although the children belonged to two different cultural and educational systems, they shared some commonalities. Smart device use is no longer a local or regional phenomenon; rather, it is a global trend that exposes children to rapid technological advancement. The results are aligned with a previous study showing that longer time spent on smart devices contributed to more behavioral problems among children.³⁵ Another study found variations in the magnitude of the negative impacts based on age, with older children using smart devices more frequently and exhibiting more behavioral problems.³⁶

The literature has consistently demonstrated that prolonged use of smart devices during childhood is associated with emotional and behavioral problems during adolescence.³⁷ This may be due to the link between intensive device use and reduced or disrupted sleep, which in turn contributes to sleep disturbances.³⁸ Consequently, sleep problems and certain behavioral patterns may increase children's risk of internalizing and externalizing behaviors, attention difficulties, and problems with peers.³⁹ Furthermore, we found that when the caregiver was the mother, higher levels of difficulty were reported compared to when the caregiver was the father. Mothers as primary caregivers emerged as a significant predictor of higher difficulty scores. This is consistent with previous reports showing that smartphone use frequency is associated with the child's sex and with mothers serving as primary caregivers.^{40,41} This may be related to cultural norms and motherhood roles. In both Jordan and Malaysia, where the majority of the population is Muslim, mothers typically assume the main responsibility for children before puberty, making them the primary caregivers for elementary school children.⁴² Additionally, emotional closeness and maternal involvement often position mothers to notice behavioral changes, emotional reactions, or negative effects of excessive screen time earlier than fathers.⁴³ As a result, mothers may feel more responsible for monitoring and regulating smart device use, and any negative impacts or signs of difficulty, such as reduced attention span or social withdrawal, may be more readily detected and reported by mothers. Moreover, mothers may hold greater concerns than fathers about the potential negative effects of screen

time on their children's development, social skills, and mental health.⁴⁴ These factors may help explain why mothers in Jordan and Malaysia reported higher difficulty scores for their children than fathers.

Several studies have shown that parental educational level correlates with children's use of smart devices. One recent study showed that longer smart device use among adolescents was associated with lower parental educational level.⁴⁵ However, a review reported inconclusive findings regarding the relationship between parental education and children's screen time.⁴⁶ These inconsistent findings may reflect cultural differences and methodological variations across studies, particularly in how smart device use is measured and how parental education is operationalized. This highlights the need for further research to clarify these associations.

One limitation of the present study relates to its data collection methods. An observation approach may have provided deeper insights into cultural and societal norms influencing smart device use. Moreover, the study relied on a relatively small sample size and a self-reported questionnaire, both of which may have introduced bias and affected the accuracy of the findings.

5. Conclusion

The current study demonstrated that across cultures and despite differences in educational systems, the use of smart devices among school children was almost similar. Furthermore, smart device use among school children was found to affect their behavior. Several factors were identified as influencing children's behavioral outcomes, including the duration of device usage and parental educational level. The study has important implications for mental healthcare professionals and school counselors. It is recommended that school counselors establish clear guidelines within schools on the appropriate and effective use of smart devices. School counselors should screen for and detect behavioral problems early among school children, establish baseline data, and track behavioral changes over time while considering potential links to smart device use. Additionally, there is a need to reinforce the parental role in monitoring their children's use of smart devices, whether for learning or entertainment.

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Conflict of interest

The authors declare no competing interests.

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Ethics approval and consent to participate

The study upheld rigorous ethical standards and received approval from the Institutional Review Board (IRB) affiliated with the principal investigator's institution, Applied Science Private University (IRB approval No.:2022-2023-4-4]) in Amman, Jordan, as well as from Universiti Sains Islam Malaysia (USIM/JKEP/2023-272), and all relevant data collection settings. The research adhered strictly to relevant guidelines and regulations, including the ethical principles of the Declaration of Helsinki. Prior to participation, all participants provided formal written informed consent. The authors ensured that participants fully understood the study's purpose, procedures, potential risks, and benefits. Confidentiality was emphasized, and all participant information used in the manuscript and supplementary materials was anonymized.

Consent for publication

All data were collected anonymously, and written informed consent for participation and publication of anonymised data was obtained from all participants prior to the study.

Availability of data

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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