

Psychosocial outcomes and related factors in adolescents using clean intermittent catheterization

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ABSTRACT

Background. Clean intermittent catheterization (CIC) is an established treatment for lower urinary tract dysfunction and has been used across age groups with voiding problems due to various etiologies. Although medically safe and straightforward, CIC may create social and emotional challenges for adolescents and their caregivers. During adolescence, when autonomy and peer acceptance become central, the need for continuous catheterization in daily life and, at times, dependence on another person can be difficult to cope with and may affect psychological well-being and peer relations. This study aimed to examine factors associated with potential psychopathology, self-perception, peer relationship characteristics, and quality of life in adolescents performing CIC.

Methods. This prospective cross-sectional study included 50 adolescents aged 12–18 years: 25 performing CIC and 25 age and sex-matched healthy controls. Participants with intellectual disability, low mental capacity preventing comprehension of study procedures, or uncorrected vision/hearing deficits were excluded. Psychiatric diagnoses were assessed using the Schedule for Affective Disorders and Schizophrenia for School-Aged Children—Present and Lifetime Version DSM-5 (K-SADS-PL). Self-perception, quality of life, behavioral difficulties, and peer relationships were evaluated using the Piers-Harris Children’s Self-Concept Scale, Pediatric Quality of Life Inventory, Strengths and Difficulties Questionnaire, and Peer Relationship Scale. Parental attitudes and caregivers’ psychological symptoms were assessed using the Parental Attitude Research Instrument and the General Health Questionnaire-28. Statistical analyses were performed using SPSS version 23.0. Group comparisons were conducted using the independent samples t-test or Mann–Whitney U test as appropriate; categorical variables were analyzed with the Chi-square or Fisher’s exact test. Multiple linear regression analysis was performed to identify independent predictors. A two-tailed p value <0.05 was considered statistically significant.

Results. The groups were similar in age, sex and sociodemographic characteristics. Adolescents performing CIC showed higher social avoidance and poorer peer relationships. Eight adolescents (32%) in the CIC group met criteria for at least one psychiatric disorder according to DSM-5. Negative parental attitudes, maternal mental disorders, primary etiology requiring CIC, age at self-catheterization initiation, and catheterization performed by another individual were identified as significant predictors of lower self-esteem, reduced quality of life, and poorer peer relationships.

Conclusion. CIC may have meaningful psychological and psychosocial effects on adolescents, influenced by clinical variables and parental factors. Early identification of risk indicators and strengthening of protective factors are essential. A multidisciplinary approach incorporating psychiatric, familial, and psychosocial components should be included in the management and follow-up of adolescents performing CIC.

Key words: adolescents, clean intermittent catheterization, quality of life, psychopathology, self-perception.

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Clean intermittent catheterization (CIC) is the most important bladder rehabilitation method used for the prevention of urinary incontinence and the preservation of kidney function in conditions such as detrusor-sphincter dyssynergia, urinary diversion, and neurogenic bladder.¹ Current European Association of Urology (EAU) and European Society for Paediatric Urology (ESPU) guidelines recommend proactive management including early initiation of clean intermittent catheterization together with pharmacological treatment regulating bladder function in children with neurogenic bladder, often beginning in the first months of life.^{2,3} Earlier initiation of CIC leads to the caregivers mastering the procedure and makes the process easier for children to accept and adapt to the CIC as they grow older.⁴ When properly performed, CIC has been shown to improve quality of life by providing better symptom management, reducing the frequency of voids, which is especially beneficial at night, and improving sleep which lowers daytime fatigue.⁵ Specific CIC-related difficulties among pediatric patients are reported as urethral pain, unavailability of the caregiver helping with the procedure, poor cooperation and collaboration, sphincter resistance to the insertion of the catheter, and poorer or inappropriate CIC routines during adolescence.⁶⁻⁹

In addition to its clinical implications, recent literature has highlighted the psychosocial burden associated with neurogenic bladder and catheterization-dependent pediatric populations. Children and adolescents requiring long-term bladder management may experience challenges related to social participation, emotional adjustment, and dependency on caregivers. Qualitative findings suggest that families report significant daily stressors associated with catheterization routines, privacy concerns, and the management of school-related situations. Moreover, psychosocial factors such as stigma, anxiety, and difficulties in treatment adherence have been increasingly recognized as important components of neurogenic lower urinary tract dysfunction management.^{10,11}

Although recent studies have increasingly acknowledged psychosocial challenges associated with catheterization-dependent pediatric populations, much of the existing literature has primarily focused on medical outcomes such as the prevention of urinary complications, preservation of kidney function, and improvements in continence. Studies specifically addressing emotional well-being, psychiatric outcomes, and peer relationship characteristics in adolescents performing clean intermittent catheterization remain limited. In particular, comprehensive evaluations using structured psychiatric diagnostic interviews are scarce.¹¹

Therefore, the present study aimed to compare psychopathology, self-perception, peer relationship characteristics, and quality of life between adolescents performing clean intermittent catheterization and healthy peers. In addition, we examined clinical and familial factors, including parental attitudes and parental psychological well-being, associated with these outcomes. By integrating structured psychiatric diagnostic assessment with multidimensional psychosocial measures, the study sought to identify independent predictors of psychological vulnerability in this population. We hypothesized that adolescents performing CIC would demonstrate higher levels of psychopathology and poorer psychosocial functioning compared to healthy peers.

Materials and Methods

Sample

This was a prospective cross-sectional study conducted at a single tertiary care center through collaboration between the Departments of Pediatric Urology and Child and Adolescent Psychiatry. The study sample comprised 25 adolescents performing CIC between the ages of 12 and 18 years who were followed in the pediatric urology department, and 25 age and sex-matched healthy adolescents recruited as

the control group. Patients who presented to the pediatric urology outpatient clinic between August 2019 and December 2020 were included in the study. Ethical approval for the study was obtained from the Ankara University Faculty of Medicine Human Research Ethics Committee (approval no: İ2-35-19). Written informed consent was obtained from parents or legal guardians, and verbal assent was obtained from all participating adolescents. The control group patients were randomly selected from patients who presented with urinary tract infection and did not have a chronic medical problem. The control group was selected to be comparable to the CIC group in terms of age, sex, and other sociodemographic characteristics based on information obtained from the Sociodemographic and Clinical Data Form. Inclusion criteria for the CIC group and control group were as follows: i) being between the ages of 12 and 18 years, ii) not being diagnosed with intellectual disability, iii) living with their family, and iv) being literate. In addition to these, the additional inclusion criteria for the control group was having no neurological or other serious medical conditions. In the CIC group, the diagnosis encompassed different forms of myelodysplasia, including occult spinal dysraphism, tethered cord, sacral malformation, and caudal regression syndrome. The patients included in the study had intact perineal sensibility and motor function in the lower limbs, but had severe bladder dysfunction requiring CIC. The main indication was bladder-emptying problems. Estimated glomerular filtration rate (eGFR, mL/min/1.73 m²) was calculated using the bedside Schwartz equation [$eGFR = 0.413 \times \text{height (cm)} / \text{serum creatinine (mg/dL)}$]. Exclusion criteria for both groups were as follows: i) low mental capacity preventing understanding of the objective of the study and the presented questionnaire, and ii) presence of any uncorrected vision/hearing deficits in the adolescents or parents.

Instruments

Sociodemographic and clinical data form

This structured form was developed by the researchers to collect demographic and clinical background information about the adolescents, including age, sex, educational status, family characteristics, and clinical variables relevant to the study. The information obtained from this form was used to ensure comparability between the CIC and control groups in terms of age, sex, and other sociodemographic characteristics. The form functioned as a structured data collection tool and was not intended as a psychometric measurement instrument.

Schedule for affective disorders and schizophrenia for school-aged children: present and lifetime version DSM-5 (K-SADS-PL-DSM5):

It is a semi-structured interview used to diagnose various psychiatric disorders in children and adolescents.¹² It was applied to parents and adolescents by a specialist in child and adolescent psychiatry. The Turkish reliability and validity study of K-SADS-PL-DSM5 was conducted by Ünal et al.¹³

The Piers-Harris children's self-concept scale (Piers-Harris CSES):

It was developed to provide a brief, self-report instrument for the assessment of self-concept in children and adolescents.¹⁴ Higher scores indicate a more positive self-evaluation in the domain being measured. The Turkish validity and reliability study of the scale was conducted by Öner.¹⁵

Pediatric quality of life inventory (PedsQL™4.0):

PedsQL 4.0 was designed to measure the core physical, mental, and social health dimensions as delineated by the World Health Organization, as well as role (school) functioning.¹⁶ Higher scores indicate better health-related quality of

life. The parent and adolescent versions of the PedsQL 4.0 were used in the present study. Turkish translation of the scale and reliability and validity studies were performed in 2007.¹⁷

Strengths and difficulties questionnaire (SDQ)

The SDQ was developed to determine adolescents' areas of strengths and problematic behaviours.¹⁸ Lower scores on the social behavior subscale and higher scores on the other subscales indicate the existence of the problems addressed by that domain.¹⁹ The validity and reliability of the Turkish version of the SDQ were established in 2008, with an acceptable internal consistency.²⁰ The parent and adolescent versions of the SDQ were used in our study.

Peer relationship scale (PRS)

The Peer Relationship Scale (PRS) was originally developed in the Turkish population by Kaner (2000), and its validity and reliability were established through comprehensive psychometric analyses, including factor analysis and internal consistency assessments.²¹ Higher scores indicate positive relationships with friends, whereas low scores indicate negative relationships.

General health questionnaire-28 (GHQ)

The GHQ was developed by Goldberg to identify acute mental illnesses that are common in the community.²² The Turkish validity and reliability study was performed by Kılıç.²³ The GHQ-28 contains 28 self-report items divided into four subscales: somatic symptoms, anxiety and insomnia, social dysfunction, and severe depression. Each subscale contains seven items asking participants to indicate how often they have recently experienced relevant symptoms on a four-point Likert scale. Based on established scoring procedures and Turkish validation studies, a GHQ-28 score of ≥ 5 was accepted as the cut-off indicating increased risk for psychological distress.

The parental attitude research instrument (PARI)

This scale is completed by parents and aims to rate parents' rearing attitudes toward their children.²⁴ Developed by Shaffer and Bell, this scale's validation and reliability in Turkish were tested by Le Compte et al. and Küçük et al.^{25,26} Increased scores for factors other than "democratic treatment and granting equality" indicate negative parental attitudes.

Procedure

The adolescents and parents were separately interviewed by the researcher using a sociodemographic data form. The K-SADS-PL-DSM5 was used to assess current and past psychiatric diagnoses based on the synthesis of information collected from interviewing the adolescent and the parent. Adolescents completed the Piers-Harris CSCS, PedsQL 4.0 adolescent form, PRS and SDQ adolescent version while parents completed the GHQ, PedsQL 4.0 parent form, SDQ parent version, and PARI.

Statistical analysis

SPSS (Statistical Package for Social Sciences) 23.0 program was used for data analysis and p values < 0.05 were considered statistically significant. The Shapiro-Wilk test was used to analyze the normality of variables. Group comparisons for continuous variables were performed using Independent Samples t-test or Mann-Whitney U test, depending on normality assumptions. Associations between categorical variables were examined using Chi-Square or Fisher Exact analysis. Pearson and Spearman correlation analyses were conducted as preliminary analyses to examine bivariate associations between variables and to assess the suitability of variables for inclusion in the regression models. Since the dependent variables (scale scores) were continuous, multiple linear regression analysis was conducted to examine the independent predictors of the outcome variables. Predictor variables were selected based on theoretical

relevance and correlation analyses. Given the relatively small sample size ($n = 25$), the number of predictors included in the final model was restricted to avoid overfitting.

To assess potential multicollinearity among predictors, Variance Inflation Factor (VIF) and tolerance values were calculated. VIF values below 5 were considered acceptable. No problematic multicollinearity was detected. Regression coefficients (β), standard errors, and p -values were reported. Statistical significance was set at $p < 0.05$ (two-tailed).

Results

Sociodemographic variables of patient and control group

The study sample consisted of 50 adolescents (CIC, $n = 25$, control, $n = 25$) between the ages of 12 and 18. Groups did not differ regarding sociodemographic characteristics. Also, the presence of close friends was not statistically significant between adolescent groups ($p:0.069$). However; there was significant difference between the groups in the frequency of social activities. The most remarkable finding was that; while adolescents in the control group preferred to be with their friends, adolescents in the CIC group stated that they preferred to be alone rather than with their friends ($p < 0.01$) (Table I).

Clinical variables of adolescents who perform CIC

Clinical and etiological characteristics of adolescents who perform CIC are presented in Table II. All participants in the CIC group were diagnosed within the myelodysplasia spectrum according to the predefined inclusion criteria. Although the underlying conditions included various forms such as occult spinal dysraphism ($n = 9$), tethered cord ($n = 7$), sacral malformation ($n = 5$), and caudal regression syndrome ($n = 4$), the group was clinically homogeneous in terms of neurological status, intellectual functioning, and absence of additional major systemic

comorbidities. None of the adolescents had a history of dialysis requirement at the time of clinical assessment. Based on estimated glomerular filtration rate (eGFR) values, seven participants had $eGFR \geq 90$ mL/min/1.73 m², ten had Stage 2 chronic kidney disease, 60–89 mL/min/1.73 m², and eight had Stage 3 chronic kidney disease (45–59 mL/min/1.73 m²). All patients were receiving oxybutynin hydrochloride at standard therapeutic doses (0.1–0.2 mg/kg). No participant was using additional medications known to have significant psychiatric or psychosocial side-effect profiles that could confound the study outcomes.

The outcomes of scales/instruments for adolescents and mothers in both groups

According to the Piers-Harris CSCS results, the mean self-concept scores of the control group were higher, except for the “anxiety” and “behaviour” subfactors. Self and proxy report PedsQL™ scores were statistically significantly different between groups for “total” and “physical health” scores ($p < 0.05$). When the “psychosocial health” scale subscores were evaluated, “psychosocial health total” scores were found to be significantly lower for the CIC group in proxy reports while “social functioning” scores were determined to be significantly lower for the CIC group ($p < 0.05$) in both self and proxy reports (Table III).

The SDQ scores for “peer relationship problems” and “prosocial behaviour” were significantly different between groups according to the self reports. “Prosocial behaviour” scores statistically distinguished the groups according to the parent reports (Table III).

The scores on the PRS in the CIC group were significantly lower except for the “trust and identification” subfactor when had been compared with those of participants in the control group (Table III). As shown in Table III, no statistically significant difference was observed between groups in terms of GHQ-28 total mean scores. However, based on the

Table I. Sociodemographic variables of CIC and control group.

	Group n(%)		p
	CIC (n:25)	Control (n:25)	
Sex, n (%)			
Male	13 (52)	15 (60)	0.774
Female	12 (48)	10 (40)	
Age (mean $\pm$ SD)	13.3 $\pm$ 2.15	13.8 $\pm$ 1.84	0.873
Maternal age (mean $\pm$ SD)	37.87 $\pm$ 7.11	39.16 $\pm$ 6.22	0.740
Paternal age (mean $\pm$ SD)	40.57 $\pm$ 6.13	40.68 $\pm$ 5.06	0.575
Number of sibling (mean $\pm$ SD)	1.21 $\pm$ 0.86	1.32 $\pm$ 0.94	0.376
Marital status of parents, n (%)			
Married	20 (80)	21 (84)	1.000
Separated	5 (20)	4 (16)	
Parental medical and psychiatric disorders, n (%)			
No	18 (72)	21 (84)	0.306
Yes	7 (28)	4 (16)	
Maternal education, n (%)			
Illiterate	1 (4)	-	0.939
Primary school	8 (32)	7 (28)	
Secondary school	11 (44)	15 (60)	
High school	3 (12)	2 (8)	
University	2 (8)	3 (12)	
Paternal education, n (%)			
Illiterate	-	-	0.252
Primary school	4 (16)	1 (4)	
Secondary school	13 (56)	15 (60)	
High school	5 (20)	7 (28)	
University	3 (12)	2 (8)	
Maternal profession, n (%)			
Yes	12 (48)	10 (40)	0.529
No	12 (48)	14 (56)	
Health employee	1 (4)	1 (4)	
Paternal profession, n (%)			
Yes	24 (96)	25 (100)	1.000
No	-	-	
Health employee	1 (4)	-	
Income (monthly), n (%)			
<2000 TL	7 (28)	7 (28)	0.799
2000-5000 TL	14 (56)	13 (52)	
>5000 TL	4 (16)	5 (20)	

Data are presented as mean $\pm$ standard deviation for continuous variables and as number (percentage) for categorical variables. Continuous variables were compared using the independent samples t-test. Categorical variables were analyzed using the Chi-square test or Fisher's exact test as appropriate. SD: standard deviation. $p < 0.05$ was considered statistically significant.

CIC: clean intermittent catheterization, TL: Turkish liras.

Table I. Continued.

	Group n(%)		P
	CIC (n:25)	Control (n:25)	
Family type, n (%)			
Nuclear family	18 (72)	20 (80)	0.733
Extended family	7 (28)	5 (20)	
Consanguinity between parents, n (%)			
Yes	7 (28)	4 (16)	0.107
No	18 (72)	21 (84)	
Social activity, n (%)			
No	2 (8)	-	0.001
Once a month	15 (60)	4 (16)	
Once a week	6 (24)	12 (48)	
2 or more times a week	2 (8)	9 (36)	
Close friend, n (%)			
Yes	14 (56)	20 (80)	0.069
No	11 (44)	5 (20)	
Friendship preference, n (%)			
Prefers to be with friends	13 (52)	23 (92)	0.002
Prefers to be alone	12 (48)	2 (8)	

Data are presented as mean $\pm$ standard deviation for continuous variables and as number (percentage) for categorical variables. Continuous variables were compared using the independent samples t-test. Categorical variables were analyzed using the Chi-square test or Fisher's exact test as appropriate. SD: standard deviation. $p < 0.05$ was considered statistically significant.

CIC: clean intermittent catheterization, TL: Turkish liras.

validated cut-off score for psychological distress (≥ 5 points), a significantly higher proportion of parents in the CIC group met the risk threshold compared with the control group (52% vs 24%, $\chi^2 = 8.32$, $p = 0.004$). The scores on the PARI were statistically significantly different between groups for the 'overprotective motherhood', 'rejecting of the housewifery role' and 'rigid disciplining' subscales (Table III). Correlations among the scale total scores are presented in Table IV.

Analysis of variables possibly affecting the scores of scales/instruments for adolescents who perform CIC

Multiple linear regression analyses were conducted to identify independent predictors of psychosocial scale scores among adolescents performing CIC (Table V). For the Piers-Harris

CSCS, higher total scores on the PARI were significantly associated with lower self-concept scores ($\beta = -0.425$, $p < 0.001$). Increasing age was also a significant negative predictor ($\beta = -0.236$, $p = 0.019$). In addition, higher GHQ-28 total scores were strongly associated with lower self-concept scores ($\beta = -0.462$, $p < 0.001$). Regarding the PedsQLTM4.0, PARI total score emerged as a significant negative predictor of quality of life ($\beta = -0.276$, $p = 0.018$). Age was also significantly associated with lower quality of life scores ($\beta = -0.414$, $p < 0.001$). Furthermore, poorer general mental health, as indicated by higher GHQ-28 scores, was independently associated with lower quality of life ($\beta = -0.339$, $p = 0.005$). For the Strength and Difficulties Questionnaire (self-report), higher PARI total scores were significantly associated with higher total difficulty scores ($\beta = 0.297$, $p = 0.040$), indicating more emotional and behavioral difficulties. Age

($p = 0.197$) and GHQ-28 total scores ($p = 0.382$) were not significant predictors in this model.

In the Peer Relationship Scale model, age was a significant negative predictor of peer relationship scores ($\beta = -0.409$, $p = 0.003$). Additionally, younger age at initiation of self-

catheterization was independently associated with better peer relationship scores, as higher age at self-catheterization initiation predicted lower scores ($\beta = -0.541$, $p = 0.002$). PARI total score ($p = 0.101$) and GHQ-28 total score ($p = 0.699$) were not statistically significant predictors in this model.

Table II. Clinical variables of adolescents who perform CIC.

Primary etiology, n (%)		Self-catheterization age (mean $\pm$ SD)	8.71 $\pm$ 1.48
Myelodysplasia	25 (100)		
Hospital visit frequency, n (%)		Urinary incontinence, n (%)	
Once a month or more often	2 (8)	Yes	11 (44)
1 time in 3 months	11 (44)	No	14 (56)
1 time in 6 months	12 (48)		
Once a year	-		
Age at first urology visit (mean $\pm$ SD)	4.98 $\pm$ 2.45	Hospitalization in the last 1 year, n (%)	
		No	11 (44)
		1 Times	10 (40)
		2-3 times	4 (16)
		3 and more	-
Presenting complaint, n (%)		Urinary tract infection in the last 1 year, n (%)	
Urinary tract infection	14 (56)	No	13 (52)
Urinary Incontinence	9 (36)	1 time	9 (36)
Consultation	2 (8)	2-3 times	3 (12)
		3 and more	-
Catheterization type, n (%)		Catheterization status, n (%)	
Urethral Catheterization	25 (100)	His / Herself	20 (80)
Suprapubic catheterization	0 (0)	Parents	5 (20)
Initiation age of CIC (mean $\pm$ SD)	6.04 $\pm$ 2.64	Reaction when she/he tells anyone, n (%)	
		Regiment	-
		Pity	4 (16)
		Supporting	6 (24)
		Neutral	15 (20)
Daily number of catheterization (mean $\pm$ SD)	4.24 $\pm$ 1.05	K-SADS-PL diagnosis, n (%)	
		No	17 (68)
		Spesific phobia	1 (4)
		Social phobia	1 (4)
		Generalized anxiety disorder	3 (15)
		Major depressive disorder	2 (8)
		ADHD	1 (4)
		Other	-

Data are presented as mean $\pm$ standard deviation or number (percentage), as appropriate. CIC: clean intermittent catheterization; ADHD: attention-deficit/hyperactivity disorder; SD: standard deviation. K-SADS-PL Schedule for affective disorders and schizophrenia for school-aged children:present and lifetime version DSM-5.

Table III. The outcomes of adolescents and mothers scales for both groups.

	CIC (n:25)	Control (n:25)	p
The Piers-Harris children's self-concept scale			
Scale total score, mean $\pm$ SD	66 $\pm$ 4.85	71.08 $\pm$ 2.05	<0.001
Happiness and satisfaction	9 (7-12)	11 (10-12)	0.013
Anxiety	9 (8-11)	10 (9-11)	0.115
Popularity	8 (7-8)	9 (9-9.5)	<0.001
Behavior	11 (10-12)	12 (11-12.5)	0.07
Physical appearance and attributes	6 (6-7)	8 (7-8)	<0.001
Intellectual and school status	5 (5-6)	6 (6-7)	<0.001
Pediatric quality of life inventory (adolescence self-report)			
Scale total score-adolescence	74.76 (64.6-83.57)	80.54 (79.57-85.42)	0.021
Physical health total score	72.56 (65.03-81.73)	81.45 (78.72-97.5)	<0.001
Psychosocial health total score	76.7 (64.7-79.96)	78.75 (75.78-81.55)	0.103
Emotional functioning	80 (67.5-85)	80 (75-80)	0.968
Social functioning	75 (60-80)	80 (70-85)	0.007
School functioning	70 (67.5-77.5)	80 (75-85)	0.006
Pediatric quality of life inventory (parent proxy-report)			
Scale total score-adolescence	73.1 (68.34-80.11)	80.25 (78.67-80.65)	0.002
Physical health total score	72.35 (67.17-77.31)	79.8 (78.75-87.92)	<0.001
Psychosocial health total score	75.1 (68.24-79.8)	77.8 (77.5-80.25)	0.017
Emotional functioning	75 (67.5-85)	80 (80-80)	0.589
Social functioning	70 (67.5-77.5)	80 (75-85)	<0.001
School functioning	80 (75-85)	75 (75-82.5)	0.68
Strength and difficulties questionnaire (self)			
Scale total score, mean $\pm$ SD	10.44 $\pm$ 2.97	9.28 $\pm$ 3.33	0.218
Conduct problems	2 (1-2)	2 (1-2)	0.958
Hyperactivity-inattention	2 (1,5-3)	2 (2-3)	0.814
Emotional symptoms	3 (2-3,5)	3 (2-3)	0.183
Peer problems	3 (2,5-4)	2 (1,5-3)	0.001
Prosocial behaviour	5 (5-6,5)	8 (7-8)	<0.001
Strength and difficulties questionnaire (parent)			
Scale total score	11 (10-13)	10 (8-12)	0.248
Conduct problems	2 (1.5-2.5)	2 (2-3)	0.132
Hyperactivity-inattention	2 (2-3)	2 (1-3)	0.07
Emotional symptoms	3 (2-4)	3 (2-4)	0.509
Peer problems	4 (3-4)	3 (2-4)	0.145
Prosocial behaviour	6 (5-6)	8 (7-8)	<0.001

Normally distributed variables are presented as mean $\pm$ standard deviation and were compared using the independent samples t-test. Non-normally distributed variables are presented as median (Q1–Q3) and were compared using the Mann–Whitney U test. Statistical significance was defined as $p < 0.05$ (two-tailed). SD: standard deviation; CIC: clean intermittent catheterization.

Table III. Continued.

	CIC (n:25)	Control (n:25)	p
Peer relationship scale			
Scale total score	61 (54.5-67.5)	75 (73-77)	<0.001
Commitment	30 (26.5-32.5)	33 (32-35.5)	<0.001
Trust and identification	15 (13-16)	15 (14-17)	0.118
Self-disclosure	7 (6-10)	14 (13-14)	<0.001
Loyalty	10 (8-11)	13 (12-13.5)	<0.001
General health questionnaire-28			
Scale total score	5 (2-8)	4 (3-4.5)	0.186
Somatic symptoms	1 (1-2)	1 (1-2)	0.691
Anxiety and insomnia	2 (1-2)	1 (1-1)	0.026
Social dysfunction	1 (0-2)	1 (0.5-1.5)	0.436
Severe depression	0 (0-1)	0 (0-0)	0.289
The parental attitude research instrument (PARI)			
Overprotective motherhood, mean $\pm$ SD	37.32 $\pm$ 5.8	28.6 $\pm$ 3.22	<0.001
Rejecting of housewifery role	28 (24-30.5)	25 (22-27)	0.007
Incompatibility, mean $\pm$ SD	14.12 $\pm$ 2.24	14.08 $\pm$ 2.28	0.95
Rigid disciplining, mean $\pm$ SD	31.12 $\pm$ 4.64	26.8 $\pm$ 2.85	<0.001
Democratic treatment and granting equality, mean $\pm$ SD	24.24 $\pm$ 3.63	25.8 $\pm$ 2.9	0.09

Normally distributed variables are presented as mean $\pm$ standard deviation and were compared using the independent samples t-test. Non-normally distributed variables are presented as median (Q1–Q3) and were compared using the Mann–Whitney U test. Statistical significance was defined as $p < 0.05$ (two-tailed). SD: standard deviation; CIC: clean intermittent catheterization.

Table IV. Correlations between study variables (scale scores).

	Piers-Harris Self-concept	PedsQL (Self)	PedsQL (Parent)	SDQ (Self)	SDQ (Parent)	Peer relationship scale	GHQ-28	PARI
Piers-Harris Self- concept	—							
PedsQL (Self)	r: 0.677 p: <0.001							
PedsQL (Parent)	r: 0.633 p: <0.001	r: 0.327 p: 0.02						
SDQ (Self)	r: -0.417 p: 0.003	r: -0.300 p: 0.034	r: -0.095 p: 0.510					
SDQ (Parent)	r: -0.324 p: 0.022	r: -0.288 p: 0.043	r: -0.240 p: 0.094	r: 0.289 p: 0.042				
Peer Relationship Scale	r: 0.785 p: <0.001	r: 0.630 p: <0.001	r: 0.484 p: <0.001	r: -0.303 p: 0.033	r: -0.215 p: 0.134			
GHQ-28	r: -0.624 p: <0.001	r: -0.501 p: <0.001	r: -0.569 p: <0.001	r: 0.244 p: 0.088	r: 0.258 p: 0.070	r: -0.411 p: 0.003		
PARI	r: -0.538 p: <0.001	r: -0.351 p: 0.012	r: -0.209 p: 0.145	r: 0.324 p: 0.022	r: 0.088 p: 0.543	r: -0.529 p: <0.001	r: 0.262 p: 0.066	—

Pearson correlation coefficients between study scales total scores are presented.

PedsQL: Pediatric Quality of Life Inventory; SDQ: Strength and Difficulties Questionnaire; PRS: Peer Relationship Scale; GHQ-28: General Health Questionnaire-28; PARI: Parental Attitude Research Instrument.

Table V. Analysis outcomes of variables that affect scale scores of adolescents who perform CIC.

The Piers-Harris children's self-concept scale	B	Std. Error	Beta	t	p
(Constant)	97.930	5.555		17.628	<0.001
The parental attitude research instrument (PARI) total score	-0.151	0.035	-0.425	-4.333	<0.001
Age	-0.562	0.231	-0.236	-2.433	0.019
General health questionnaire-28 total score	-0.508	0.110	-0.462	-4.606	<0.001
Pediatric quality of life inventory					
(Constant)	168.587	20.761		8.120	<.001
The parental attitude research instrument (PARI) total score	-0.321	0.130	-0.276	-2.458	0.018
Age	-3.224	0.864	-0.414	-3.734	<0.001
General health questionnaire-28 total score	-1.214	0.412	-0.339	-2.948	0.005
Strength and Difficulties Questionnaire (Self)					
(Constant)	-4.346	5.633		-0.772	0.444
The parental attitude research instrument (PARI) total score	0.075	0.035	0.297	2.114	0.040
Age	0.307	0.234	0.182	1.310	0.197
General health questionnaire-28 total score	0.099	0.112	0.127	0.882	0.382
Peer Relationship Scale					
(Constant)	116.318	12.491		9.312	<0.001
The parental attitude research instrument (PARI) total score	-0.122	0.071	-0.201	-1.720	0.101
General health questionnaire-28 total Score	-0.100	0.256	-0.064	-0.393	0.699
Age	-1.642	0.494	-0.409	-3.324	0.003
Self-catheterization age	-1.660	0.474	-0.541	-3.502	0.002

Multiple linear regression analysis was performed to identify independent predictors of scale scores. Unstandardized regression coefficients (B), standard errors (SE), standardized coefficients (β), t values, and p values are presented. Statistical significance was defined as $p < 0.05$ (two-tailed).

Discussion

In this study, we comprehensively evaluated psychiatric and psychosocial functioning in adolescents performing clean intermittent catheterization (CIC) and examined potential familial correlates. The main findings were that adolescents in the CIC group demonstrated a higher burden of psychopathology and poorer psychosocial functioning compared with healthy peers, including lower self-perception and quality of life, alongside more pronounced difficulties in peer relationships and social participation. Notably, indicators of social withdrawal were prominent (e.g., preference for being alone, avoidance of social activities, and limited disclosure of CIC to peers), highlighting the potential role of stigma and secrecy in daily adolescent life. In addition, parental factors—particularly parental attitudes and parental

psychological well-being—were associated with key adolescent outcomes, underscoring the importance of incorporating a family-focused perspective into CIC management. Collectively, these findings extend the existing literature, which has largely emphasized medical outcomes, by integrating structured psychiatric assessment with multidimensional psychosocial measures in a catheterization-dependent adolescent population. While psychosocial challenges associated with catheterization and chronic urological conditions have been previously explored in pediatric populations, much of the literature has emphasized medical outcomes and treatment adherence. Understanding how these challenges manifest within the developmental context of adolescence may therefore provide important insights into the unique psychosocial burden of performing CIC.

Previous studies describing catheterization-dependent pediatric populations have identified several psychosocial challenges associated with CIC, including reduced motivation, urinary incontinence despite treatment, embarrassment, difficulties organizing catheterization routines outside the home, fear of urethral injury, and inconvenience.²⁷ Furthermore, there is a close connection, both physically and emotionally, between the sexual organs and the urinary tract. Catheterisation can in many ways be perceived as a disturbing procedure, and some patients especially adolescents may experience the procedure as a traumatic event.²⁸ As a result of these potential obstacles, discontinuation rates of CIC in children range from 8% to 63%. Treatment adherence has been shown to be lower among adolescents.⁸

CIC requires great mental and physical capacity, as well as strict self-discipline.²⁹ In the adolescence period with its greater stress related to peer approval and body image, increased problems with accepting CIC may be anticipated.³⁰ There is also a group of children in need of CIC; apart from their severe bladder dysfunction, they look and act like all other healthy children. During their first years of life, their parents or caregivers perform CIC for these children. However, as these children grow up and become independent adolescents, it is not always easy to motivate them to continue CIC.⁸

One of the remarkable differences between the two groups was that; while adolescents in the control group preferred to be with their friends, adolescents in the CIC group stated that they preferred to be alone rather than with their friends. Consistent with this finding, parents in the CIC group also reported that their children occasionally had been avoided social activity. More than half of the adolescents (52%) did not tell their friends that they had been performing CIC. In addition, only a small group (24%) thought that if they shared this situation with their friends, they could receive a supportive response. These findings showing social avoidance behaviors were also supported by the evaluation of SDQ self reports and the PRS.

Similar to our findings; Lopes et al. showed that children and adolescents with lower urinary tract dysfunction tend to develop an introspective behavior in relation to their peers, because they fear the discrimination that may result from the exposure of their dysfunction.³¹ The presence of malformations or the need to undergo special medical procedures was associated with the fear of peer rejection or discrimination, which could characterize the impact of the presence of a chronic disease on socialization.³² The “social stigma” and “invisibility” of the disorder can make the disclosure and the self-acceptance of the problem much harder.³³ Some adolescents who need CIC may be sensitive to peer opinions and remarks, therefore they may choose to be incontinent and wear diapers rather than be continent and perform CIC at school.³⁴ Even today, a stigma exists in society towards urinary problems in general, and this may cause reluctance to catheterize. Some patients have reported a feeling of shame when having to perform CIC. The importance given to secrecy and discretion results in some patients and especially in adolescents may avoid individuals to perform CIC in public toilets or at other people’s homes.³⁵ It may be thought that this can be more common during adolescence and could be one of the main reasons for avoiding social activities. Patients also may view CIC as a task they are compelled to perform, rather than a technique that provides convenience and comfort in managing urinary troubles. This point of view is against the independent nature of adolescents, and it may lead the adolescent to completely withdraw from social environments.

In line with our findings, Lindehall et al. qualitatively explored psychosocial factors among teenagers and young adults with myelomeningocele who had long-term experience with CIC and highlighted themes related to disclosure, integrity/privacy concerns, and the impact of catheterization on friendships and close relationships.⁹ Their participants commonly reported difficulties in deciding whether to inform peers and emphasized the fear of negative reactions, which is consistent

with the limited disclosure and low expectation of peer support observed in our cohort.⁹ Notably, while Lindehall et al. focused on subjective experiences and interpersonal themes, our study extends this literature by combining structured psychiatric diagnostic assessment with quantitative measures of self-perception, peer relationships, and quality of life, thereby demonstrating that social and peer-related burdens may co-occur with clinically relevant psychopathology in a subset of adolescents performing CIC.⁹

Findings from other studies in adolescents and young adults similarly underline that adolescence is a particularly vulnerable period for maintaining adherence and coping with the daily demands of CIC.⁸ In parallel with this literature, our results suggest that psychosocial challenges are not limited to practical barriers but also include developmental concerns such as autonomy, body image, and peer acceptance, which may contribute to social withdrawal and reduced well-being. Taken together, these findings support the need for multidisciplinary follow-up that addresses both urological management and age-specific psychosocial needs.^{8,9}

The most important variables that predict low self-esteem, low quality of life and negative peer relationships in adolescents who perform CIC could be; negative parental attitudes, maternal mental disorders, age at self-catheterization initiation and catheterization by someone else. Similar to our findings, some of the studies based on children's self reports suggested that self-catheterization contributed to raising self-esteem in several instances.²⁷ However, some studies did not point to such a difference between self catheterization and catheterization by someone else.³⁶ Generally, the psychological consequences of stressors may be determined by their controllability. Therefore, it may be logical to think that children and adolescents gaining some mastery over their physical condition by being able to self-catheterize would have lower rates of psychological disturbance. Furthermore, improvements in self-esteem

and the ability to engage in more independent social contacts would be expected if they were taking some responsibility for their own condition themselves.³⁶ Therefore, especially during adolescence which is characterized by the need to be independent, it may be important for clinicians to be vigilant and sensitive to these aforementioned issues in order to help adolescents to increase their quality of life and psychological well-being.

In line with our research, another important point we want to emphasize is that; studies of parental adaptation indicated that parents of children with disabilities were more likely than other parents to suffer from stress, anxiety, and depression, and experienced stress that was especially apparent in all interpersonal relationships but particularly prominent in the marital bond and relationships.³⁷ This impact may lead parents to develop negative attitudes toward controlling their children. In particular, overprotective parental attitudes which aimed at the well-being of the adolescent, could prevent the adolescent from gaining self-efficacy and reduce treatment compliance. Therefore, in adolescents performing CIC in addition to urological treatment, evaluating the psychiatric status of parents and their attitudes toward their children should be an important component of the follow-up. With this perspective, parents would be better equipped to help their children to overcome their anxiety and fears, and be more supportive in their children's ongoing care of the them.

The effect of performing CIC on quality of life has generally been investigated in adult populations and mostly focused on physiological measures of the application.^{38,39} In our study, we aimed to reveal the difficulties experienced by adolescents due to CIC application, apart from the existing neurological barriers, by evaluating a group performing CIC. Contrary to studies showing that performing CIC did not have a negative effect on quality of life and self-perception, lower quality of life and self-perception scores were observed in the adolescent group who performed CIC compared to the healthy

group in our study.^{5,40} Our explanation of our finding is that it may be related to the current study including only adolescents. Adolescence has been also characterized by heightened emotional reactions and believed to be a peak period for mental health problems.⁴¹ The frequency of psychopathology (32%) detected in the CIC group also indicates the risk of this period especially for adolescents with chronic diseases.

Study limitations and strengths

There are several limitations to our study. First, the cross-sectional nature of the study did not allow us to conclude whether differences in quality of life, self-esteem and peer relationships were a result of performing CIC or whether they were just coincidental. Due to the same reason, we could not assess the possible changes in parental attitudes over time. Additionally, it was difficult to isolate the independent psychological impact of CIC from the broader effects of chronic disease burden, body image concerns, continence-related difficulties, social isolation, and underlying neurological conditions. The second limitation is that in order to complete psychometric evaluations, we excluded adolescents with intellectual disabilities. It is possible that this group has more cognitive, psychiatric and social problems. Another limitation of this study is the relatively small sample size, which may have limited the statistical power to detect small effect sizes. Although all eligible patients during the study period were included, the findings should be interpreted cautiously and considered exploratory in nature.

On the other hand, to our knowledge, this is the first study to assess the clinical variables related to these factors and the presence of possible psychopathology with a high-quality semi-structured psychiatric interview in this group.

Conclusion

In conclusion, these results suggest that performing CIC may have psychological and

social impacts on adolescents. Furthermore, such effects may be affected by disease-specific clinical variables, parental attitudes, and parental mental state. Risk factors must be well identified to decrease these negative effects. Our findings may guide clinicians during adolescence, when treatment compliance may decrease. Efficient psychosocial evaluation and sensitivity to the emotional needs of adolescents are also equally essential, alongside educating adolescents and helping them gain competence in self-CIC. Our study emphasizes that psychiatric evaluations must not be disregarded in the follow-up of adolescents who perform CIC. Additionally, health care professionals who work with such patients must be aware of the warning signs of deeper psychiatric problems, pathological parental attitudes and the need for psychiatric consultation. Findings need to be confirmed in a larger sample with prospective studies.

Ethical approval

The study was approved by Human Research Ethical Committee of Ankara University (date: 18.07.2019, number: İ2-35-19).

Author contribution

The authors confirm contribution to the paper as follows: Study conception and design: TMB, MB, MÇU, BB; data collection: TMB, GYE, MB, AA; analysis and interpretation of results: TMB, MÇU; draft manuscript preparation: TMB, MÇU, ÖY, BGK. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of interest

The authors declare that there is no conflict of interest.

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