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Risk Factors for Physical Restraint Use with Children and Youth in Community and Inpatient Mental Health Settings in Ontario

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Abstract

Introduction: The application of physical restraints in child and youth mental health settings remains controversial. Physical restraints are control interventions involving the use of a physical device or manual holding to restrict a young person's movement. Although their use is permitted to manage risky behaviours, physical restraints can cause severe physical and psychological harm in children and youth. Existing literature on restraint use focuses on children and youth in inpatient settings, while research on its use in community health settings remains limited. **Methods:** The current study aims to examine patterns and risk factors associated with the use of physical restraints among children and youth in both inpatient and community health settings. Data for this study were drawn from the interRAI Child and Youth Mental Health (ChYMH) assessment instruments (including those with developmental disabilities; ChYMH-DD), implemented by trained professionals as part of standard clinical practice. The sample comprised of 32,422 children and youth aged 4-18 receiving mental health services in Ontario between 2012 and 2022, across community and inpatient settings. This study employed a retrospective secondary analysis of assessment data. Logistic regression analysis was used to identify factors associated with physical restraint use. **Results:** In our sample, males and younger children (4-11) experienced the most physical restraint. Results indicated that children with a diagnosis of autism (ASD), reactive attachment disorder, schizophrenia and other psychotic disorders, and substance use disorder experienced higher rates of physical restraint than those without a diagnosis. Furthermore, externalizing symptoms, internalizing symptoms, risk of suicide and self harm, high caregiver distress, dependent cognitive skills, and living with a nonrelative were associated with physical restraint use. **Conclusions:** Findings provide researchers and clinicians with important insights into risk factors for

physical restraint among vulnerable children and youth, which can be used to inform care planning and the development of targeted prevention and early intervention programs. This research highlights the importance of identifying trauma, providing trauma-informed care, and using a standardized assessment-to-intervention approach across service sectors to reduce the use of physical restraints in child and youth mental health settings.

Keywords: Physical restraint[1], risk factors[2], inpatient and community health settings[3], trauma-informed care[4], Child and Youth Mental Health Assessment[5], interRAI[6]

1 Background

The use of physical restraints in child and youth mental health settings remains a highly contentious practice. Physical restraint is a control intervention that refers to any activity involving one or more staff member holding and restricting a young person's body [1]. This includes both manual holding to limit movement, and the use of physical devices to prevent mobility. In Ontario, physical restraint of a child or young person is permitted when they present imminent risk to the safety and well-being of themselves or others [2]. In psychiatric and mental health facilities, physical restraint is utilized to de-escalate individuals in severe psychiatric distress and to protect patients and staff from harm [3-5]. Although its use is permitted, physical restraint can cause severe physical and psychological harm in children and youth [6-8].

Literature on restraint use suggests that between 27% and 47% of children and youth in psychiatric inpatient facilities experience some type of physical restraint during their course of treatment [9-13]. Prevalence rates

of restraint use in community mental health facilities remain underreported. In inpatient settings, physical restraint is often used in response to escalating risky behaviours among children and youth, including extreme displays of aggression and attempts of self harm or suicidal behaviour [3,12-16,18,19,33]. In some cases, restraint has been used in response to lower-level behaviours such as opposition, disinhibition, and absconsion [13,17].

Certain demographic variables may increase risk of physical restraint use among children and youth in inpatient health settings. For example, studies have found that age is associated with restraint use, with children under the age of 13 being at higher risk of experiencing physical restraint than youth over the age of 13 [11,16,18,20]. Children of racial minorities and non-white ethnicity have been found to experience higher rates of physical restraint than white children [20-22]. Notably, there are some inconsistencies in the literature with respect to sex differences. For instance, some research suggests that males are more likely to be physically restrained than females [3,16,17], while others have suggested that females may be more likely to experience multiple physical restraints than males [10,12].

Having a formal diagnosis regularly emerges as a predictor of restraint use in the literature [3,11,14,16,19,23]. Research suggests that physical restraint use is common among children and youth with developmental disabilities, including autism spectrum disorder (ASD) [24,25,26-30]. Extant literature on restraint use indicates that children with

externalizing disorders, including oppositional defiant disorder and conduct disorder [14,23,31], as well as those with internalizing disorders such as depression, anxiety, and mood disorders [3,10,31], are at risk of experiencing physical restraint. Moreover, substance use disorders, attachment disorders, post-traumatic stress disorder, and psychotic disorders have been associated with physical restraint use [19,22,23,32]. Research suggests that having numerous comorbid diagnoses further increases risk of physical restraint [14,17].

To date, studies have found that children and youth with multiple previous inpatient admissions, and those admitted on an emergency basis, are at heightened risk of experiencing physical restraint [3,11,14,34]. In inpatient settings, staff members' stress levels and familiarity with control policies appear to influence use of physical restraint [34,35]. Poor family functioning [36],out-of-home placements (e.g., foster care placement) [19], and experiences of physical abuse [37] have been identified as risk factors for physical restraint use as well.

While use of physical restraint is permitted in mental health facilities in Ontario under certain conditions, it can be extremely harmful to the health and well-being of vulnerable children and youth. Physically restraining a child, especially when done improperly, can cause physical injury including bruising, asphyxiation, and even death [17,38]. Physical restraint can be extremely traumatizing, and re-traumatizing for children and youth who have experienced any form of abuse [7,39,40], potentially

leading to emotional distress [41] and increasing externalizing behaviours [14,17].

Given the psychological harm and trauma that physical restraint can cause, understanding the risk factors of this issue is essential, especially across different service settings. Given that the existing literature on restraint use focuses on children and youth in inpatient settings, the current study aims to examine patterns and risk factors associated with the use of physical restraint among children and youth in both inpatient and community health settings. This study utilizes data from the interRAI Child and Youth Mental Health (ChYMH) assessment instrument, collected from children and youth receiving mental health services in Ontario. Based on the extant literature, it was hypothesized that younger age, out-of-home placement, high caregiver distress, severely dependent cognitive skills of the child or youth, as well as high internalizing symptoms and externalizing symptoms, would be associated with physical restraint use. Understanding how these factors contribute to physical restraint use will be essential in informing clinical care planning, service delivery and policy change.

Given the potential for both immediate safety benefits and significant physical and psychological harm, the use of physical restraint practices in child and youth mental health settings raises important ethical considerations regarding children’s rights, the risk of re-traumatization, and the potential for misuse. These concerns highlight the importance of

understanding factors associated with restraint use to inform safer, more ethical care practices.

2 Methods

2.1 Study Design

Data for this study were obtained from the interRAI ChYMH and ChYMH-DD assessments of children and youth seeking mental health treatment in Ontario. Assessments were completed by multi-disciplinary assessors (nurses, social workers, psychologists etc…) trained to implement these instruments as part of regular clinical practice at various community and inpatient service settings in Ontario. This study employed a retrospective secondary analysis of assessment data.

2.2 Sample

This study's sample consisted of children and youth in Ontario aged 4 to 18 years, with a first completed assessment between January 1, 2012 and March 31, 2024. The sample included a total of 32,422 children and youth (ChYMH: 31,585; ChYMH-DD: 857).

2.3 Instruments

The interRAI Child and Youth Mental Health (interRAI ChYMH) [1] and ChYMH-DD (interRAI ChYMH-DD; for children with Developmental Disabilities) assessments [42] are semi-structured clinician-rated interview-

based assessment tools that collect data from over 400 items (such as indicators for mental health, treatment planning, social and clinical characteristics). The separate instruments were designed for use in community or inpatient mental health agencies. Assessments are completed by trained clinicians overseeing care of the child or youth. Information is gathered based on clinical records, observations, case notes, interviewing the child/youth/family members, and consultation with other professionals [1]. The data collected as part of standard of care provides detailed information related to the use of one or more physical restraint (i.e., a physical device used to prevent ambulation or use of arms (e.g., bed restraints, wrist restraints), or manual holding). In this study, physical restraint use was measured as a single binary yes/no occurrence in the past three days. Embedded in both the ChYMH and ChYMH-DD are validated scales, algorithms and care planning protocols called Collaborative Action Plans (CAPs) that have robust psychometric properties and internal consistency [43-46]. The standardized assessment instruments have been used to support resource allocation and triaging [43]. Data are submitted by agencies using the ChYMH and ChYMH-DD to the interRAI Canada server, where data are deidentified and held. Secondary use of ChYMH and ChYMH-DD data were approved through Western University's Ethics Board.

2.4 Sociodemographic Characteristics

Baseline characteristics such as age (categorized into 4-7, 8-11, 12-15 and 16-18 years), sex (male, female, or other), and primary language were collected. Residential instability, based on the child experiencing 3 or more moves, having no permanent address, homelessness, living in a shelter or "couch surfing" in the last two years was ascertained. Living arrangement was also captured and categorized into four levels including: (1) alone, with siblings (i.e., no parents/primary caregivers, with relatives), (2) with parents or primary caregivers, (3) with foster family, or (4) with nonrelatives (excluding foster family). The marital status of the parents included never married, married, with a partner or significant other, widowed, separated, divorced, or marital status unknown.

2.5 Provisional Diagnostic Categories

The psychiatrist or attending physician implementing the ChYMH or ChYMH-DD also identified all provisional diagnostic categories based on clinical assessment at the time of admission, and ranked their importance as factors contributing to the admission. Possible diagnostic categories included: reactive attachment disorder, attention deficit hyperactivity disorder, disruptive behaviour disorder, learning or communication disorder, autism spectrum disorder, substance-related disorders, schizophrenia and other psychotic disorders, mood disorders, anxiety disorder, eating disorders, sleep disorders, and adjustment disorders. All diagnostic categories were rated as (0) not present, (1) most important, (2)

second most important, (3) third most important, (4) less important, and (5) no provisional diagnosis. Diagnostic categories were then recoded into present (i.e., including most important, second most important, third most important, or less important), and not present (i.e., no provisional diagnosis, and not present) to capture the presence of any clinically identified condition contributing to admission, regardless of relative ranking. This approach was selected to reduce sparsity across diagnostic categories. Disorders with low frequency were not individually reported. Multimorbidity was coded as the presence of 2 or more of any of the mental or neurodevelopmental disorders included in the diagnostic categories.

2.6 Polyvictimization

Polyvictimization was derived based on four questions on the ChYMH or ChYMH-DD related to traumatic life events experienced by the child or youth, including being a victim of physical abuse, sexual assault or abuse, emotional abuse, and witnessing domestic violence. Response options included never, more than 1 year ago, 31 days-1 year ago, 8-30 days ago, 4-7 days ago, or in the last 3 days. Additional questions regarding neglect such as the presence of physical neglect, emotional neglect, and unmet safety needs were also scored as none, or the individual's age at earliest occurrence. Each of these response options were dichotomized into none or present and categorized into a three-level variable including (0) (reflecting no trauma), (1) (one type of trauma), (2) (two types of trauma), and (3)

(three or more types of trauma). This approach aligned with previous categorizations of polyvictimization [47].

2.7 Scales and Collaborative Action Plans

A variety of Collaborative Action Plans (CAPs), scales, and clinical characteristics embedded in the ChYMH were also included. When triggered, CAPs highlight key care needs of the individual. The Transitions CAP [48,49] can be triggered to flag children or youth who require transition planning from one setting to another (e.g., vocational or mental health setting). When triggered, the Informal Support CAP [50] indicates that the child's family has unmet needs (e.g., occasional support, emotional support, financial problems, babysitting, respite care), however they do not have family members or close friends able to provide consistent informal support.

The Caregiver Distress Scale measures the degree and diversity of caregiver distress factors, with scores ranging from 0 (no/low distress) to 3 (high distress). The scale includes items that measure the parent or primary caregiver(s) having experienced a major life stressor in the last 90 days, unable to continue providing caring activities, or their expression of distress, anger or depression [51].

The *Risk of Suicide and Self Harm in Kids* (RISsK) algorithm [52] was also included in the present study and reflects the child/youth's level of risk

for death by suicide or self harm. The RISsK algorithm is based on items such as *Depression Severity Index* [53] measuring the presence of negative statements, sad or worried facial expression, lack of motivation, self-deprecation as well as other signs including intent to kill oneself, considering or attempting self-injuring, the family feeling overwhelmed, and family concern surrounding the potential for self-injury. The algorithm has a score that ranges from 0 to 6, where higher scores indicate increased level of risk. The RISsK algorithm was categorized into two categories reflecting no risk/unknown to moderate (scores <=2) or high risk (scores >=3).

The *Internalizing* scale measures the frequency and severity of internalizing symptoms (e.g., anxiety, anhedonia) [54] whereas the *Externalizing* scale measures the frequency and severity of behavioural symptoms that are reactive (e.g., impulsivity, physically abusive toward others) or proactive (e.g., stealing, violent ideation) in nature [55]. Both the *Internalizing* and *Externalizing* scales consist of 12 items that range from 0 to 48, with higher scores indicating the higher symptom presentation. Each individual item is scored from 0 (not present) to 4 (exhibited daily in the last 3 days, 3 or more episodes or continuously). The total sums from each scale were categorized into three levels including (1) low/none, reflecting scores less than or equal to 12; (2) moderate, encompassing scores between 13-35; and (3) high, reflecting scores greater than or equal to 36.

The *Cognitive Skills for Daily Decision-making* scale measures the child or youth's ability to make decisions regarding tasks of daily living. The item response options range from (0) independent to (4) severely dependent. The variable was categorized into two levels: (1) independent, modified or minimally dependent, and (2) moderately/severely dependent [1,42].

2.8 Analysis

Bivariate analyses were used to examine differences in physical restraint use across instruments, as well as sociodemographic and clinical characteristics. For categorical variables, chi-square tests were used to assess differences. Statistical significance was defined based on a threshold of $\alpha=0.05$. Multivariable logistic regression analysis was then used to identify factors associated with physical restraint use. Multicollinearity was assessed using variance inflation factors (VIF) and tolerance values. All VIFs were below 1.4, and tolerance values exceeded 0.70, suggesting no evidence of multicollinearity. Variables included in the multivariable logistic regression model were selected based on statistical significance in bivariate analyses. Variables that remained significantly associated with physical restraint use were retained in the final reported model. Adjusted odds ratios (OR) and 95% confidence intervals (CI) from the multivariable logistic regression model were calculated to estimate the strength of associations.

Logistic regression models were assessed using the c-statistic, with values ≥ 0.8 generally indicating good model discrimination.

3 Results

Table 1 presents the frequency of physical restraint use in both the ChYMH and ChYMH-DD. Of children and youth assessed using the ChYMH, 3.2% (N=1,001) had physical restraint use within the last 3 days of the assessment. A total of 16.0% (N=137) of children and youth assessed using the ChYMH-DD had experienced recent physical restraint use.

Table 1. Frequency of Physical Restraints (First Completed Assessment)

	Physical Restraint Use				
	No		**Yes**		**p-value**
Instrument	%	N	%	N	<.0001
ChYMH	96.8	30,584	3.2	1,001	
ChYMH-DD	84.0	720	16.0	137	

The baseline sociodemographic characteristics of the children and youth are presented in Table 2. The average age of the overall sample was 12.4 (SD: 3.5). Of the sample, the majority of children and youth lived with their primary caregivers or parents (N=29,967; 92.4% of the total sample). The most common marital status of the child’s parents was married

(N=13,579; 41.9% of the total sample), followed by never married (N=6,586; 20.3% of the total sample).

Table 2. Baseline Demographic Characteristics of the Sample Population, stratified by Physical Restraint Use (N=32,442)

	Physical Restraint Use		
Characteristic	**No** 96.5 (31,304) % (N)	**Yes** 3.5 (1,138) % (N)	**p-value**
Sex			<.0001
male	95.1 (15,658)	4.9 (800)	
female/other	97.9 (15,646)	2.1 (338)	
Age Group in Years			<.0001
4-7	94.9 (4,248)	5.1 (228)	
8-11	95.0 (9,225)	5.0 (488)	
12-15	97.4 (8,731)	2.6 (232)	
16-18	98.0 (9,100)	2.0 (190)	
Language			0.0283
English	96.4 (29,693)	3.6 (1,096)	
Other	97.5 (1,611)	2.5 (42)	
Living Arrangement			<.0001
Alone; With sibling(s), no parent(s)/primary caregiver(s); with other relative(s); other	96.5 (1,416)	3.5 (51)	
With parent(s) or primary caregiver(s)	96.7 (28,980)	3.3 (987)	
With foster family	94.3 (479)	5.7 (29)	
With nonrelative(s), excluding foster family	85.8 (429)	14.2 (71)	
Residential Instability			<.0001
Yes	93.6 (2,092)	6.4 (143)	
No	96.7 (29,212)	3.3 (995)	
Marital status of parents			<.0001
Never married	95.2 (6,267)	4.8 (319)	
Married	97.1 (13,184)	2.9 (395)	
Partner/significant other	94.5 (682)	5.5 (40)	

Widowed	97.2 (667)	2.8 (19)	
Separated	96.4 (3,954)	3.6 (148)	
Divorced	97.3 (4,703)	2.7 (130)	
Marital status unknown/other	95.5 (1,847)	4.5 (87)	
Polyvictimization			<.0001
0 (no trauma)	97.2 (17,049)	2.8 (493)	
1 (one type of trauma)	97.2 (3,836)	2.8 (110)	
2 (two types of trauma)	96.6 (2,856)	3.4 (101)	
3 (three or more types of trauma)	94.6 (7,563)	5.4 (434)	

The presence of provisional diagnoses is presented in Table 3. Among children and youth who recently experienced physical restraint use, reactive attachment disorder (N=46; 11.4%), followed by autism (N=225; 8.4%), schizophrenia and other psychotic disorders (N=12; 7.7%), and substance-related disorders (N=35; 7.2%) were most common. Other common disorders among children and youth that experienced physical restraint use were adjustment disorders (N=54; 6.3%), attention deficit hyperactivity disorder (N=643; 5.7%), and multimorbidity (N=701; 5.4%).

Table 3. Frequency of Provisional Diagnostic Categories in the Sample Population (N=32,442)

	Physical Restraint Use		
	No 96.5 (31,304) % (N)	**Yes** 3.5 (1,138) % (N)	**p-value**
Provisional Diagnostic Categories			
Autism			<.0001
not present	96.9 (28,857)	3.1 (913)	
present	91.6 (2,447)	8.4 (225)	
Substance-related disorders			<.0001

not present	96.5 (30,854)	3.5 (1,103)	
present	92.8 (450)	7.2 (35)	
Schizophrenia and other psychotic disorders			0.0044
not present	96.5 (31,160)	3.5 (1,126)	
present	92.3 (144)	7.7 (12)	
Depressive disorders			0.1710
not present	96.4 (26,263)	3.6 (972)	
present	96.8 (5,041)	3.2 (166)	
Anxiety disorders			0.0840
not present	96.6 (21,229)	3.4 (744)	
present	96.2 (10,075)	3.8 (394)	
Adjustment disorders			<.0001
not present	96.6 (30,497)	3.4 (1,084)	
present	93.7 (807)	6.3 (54)	
Attention deficit hyperactivity disorder			<.0001
not present	97.7 (20,637)	2.3 (495)	
present	94.3 (10,667)	5.7 (643)	
Reactive attachment disorder			<.0001
not present	96.6 (30,945)	3.4 (1,092)	
present	88.6 (359)	11.4 (46)	
Multimorbidity			<.0001
no	97.7 (18,999)	2.3 (437)	
yes	94.6 (12,305)	5.4 (701)	

A variety of CAPs, scales, and clinical characteristics are presented in Table 4. Children with high (N=85; 22.8%) or moderate (N=745; 8.3%) externalizing symptoms, and children with moderately or severely dependent (N=320; 9.6%) cognitive skills had proportionally more physical restraint use. Children with a primary caregiver reporting high distress (N=55; 11.5%) also had proportionally higher physical restraint use.

Table 4. Selected Collaborative Action Plans, Scales and Clinical Characteristics of the Sample Population, stratified by Physical Restraint Use (N=32,442)

	Physical Restraint Use		
	No 96.5 (31,304) % (N)	**Yes** 3.5 (1,138) % (N)	**p-value**
Caregiver Distress			<.0001
none/low/moderate distress	96.6 (30,879)	3.4 (1,083)	
high distress	88.5 (425)	11.5 (55)	
Informal support			<.0001
not triggered/unknown	97.3 (26,363)	2.7 (723)	
triggered	92.3 (4,941)	7.7 (415)	
Transitions			<.0001
not triggered/unknown	97.7 (25,350)	2.3 (596)	
triggered	91.7 (5,954)	8.3 (542)	
Risk of Suicide and Self Harm in Kids			<.0001
unknown/no risk/low/moderate (scores <=2)	97.2 (23,130)	2.8 (669)	
high risk (scores >=3)	94.6 (8,174)	5.4 (469)	
Cognitive Skills for Daily Decision Making			<.0001
independent, modified or minimally dependent	97.2 (28,296)	2.8 (818)	

moderately/severely dependent	90.4 (3,008)	9.6 (320)	
Internalizing Scale			<.0001
low/none (scores <=12)	96.9 (21,453)	3.1 (674)	
moderate (scores 13-35)	95.6 (9,449)	4.4 (433)	
high (scores >=36)	92.8 (402)	7.2 (31)	
Externalizing Scale			<.0001
low/none (scores <=12)	98.7 (22,810)	1.3 (308)	
moderate (scores 13-35)	91.7 (8,206)	8.3 (745)	
high (scores >=36)	77.2 (288)	22.8 (85)	

Table 5 presents the results of the final logistic regression model, predicting restraint use among children and youth in the sample. The strongest predictor of physical restraint use was high externalizing symptoms (OR:6.46; 95% CI: 4.78-8.72), followed by moderate externalizing symptoms (OR: 3.42; 95% CI: 2.94-3.97), and living with a nonrelative, excluding a foster family (OR: 3.30; 95% CI: 2.44-4.45). Triggering the Transitions CAP (OR: 2.22; 95% CI: 1.95-2.54) and high internalizing symptoms (OR: 1.81; 95% CI: 1.18-2.76) were also strong predictors of physical restraint use. Children who were younger in age were also more likely to experience restraint use than older children.

Table 5. Logistic Regression, predicting restraint use (N=32,442)

Characteristic	**Final Model** c statistic: 0.83		
	OR	**95% CI**	**p-value**
Age (reference: 16-18 years)			

		1.98-3.16	**<.0001**
4-7	**2.50**		
		1.78-2.62	**<.0001**
8-11	**2.16**		
		0.98-1.47	0.0859
12-15	1.20		
Sex (reference: female)			
		1.29-1.71	**<.0001**
male	**1.48**		
		0.14-2.52	0.4847
other	0.60		
Living arrangement (reference: with parent(s) or primary caregiver(s))			
Alone; With sibling(s), no parent(s)/primary caregiver(s); with other relative(s); other)	0.84	0.62-1.14	0.2560
		0.71-1.60	0.7642
With foster family	1.06		
		2.44-4.45	**<.0001**
With nonrelative(s), excluding foster family	**3.30**		
Caregiver Distress (reference: no/low/moderate distress)			
		1.04-1.97	**0.0280**
High distress	**1.43**		
Informal Support (reference: not triggered/unknown)			
		1.36-1.79	**<.0001**
Triggered	**1.56**		
Transitions (reference: not triggered/unknown)			
		1.95-2.54	**<.0001**
Triggered	**2.22**		
Internalizing symptoms (reference: low/none)			
		0.89-1.19	0.7099
moderate (scores 13-35)	1.03		
		1.18-2.76	**0.0063**
high (scores >=36)	**1.81**		
Externalizing Symptoms (reference: low/none)			
		2.94-3.97	**<.0001**
moderate (scores 13-35)	**3.42**		
		4.78-8.72	**<.0001**
high (scores >=36)	**6.46**		

Cognitive Skills for Daily Decision Making (reference: independent/modified or minimally dependent)			
moderately/severely dependent	**1.36**	**1.17-1.59**	**<.0001**
Risk of Suicide and Self Harm in Kids (reference: unknown/none/low/moderate)			
high risk (scores >=3)	**1.65**	**1.42-1.92**	**<.0001**
Polyvictimization (reference: none)			
1 (one type of trauma)	0.88	0.71-1.09	0.2435
2 (two types of trauma)	1.05	0.84-1.32	0.6574
3 (three or more types of trauma)	**1.42**	**1.22-1.66**	**<.0001**
Autism (reference: not present)			
present	**1.70**	**1.43-2.02**	**<.0001**
Multimorbidity (reference: no)			
yes	**1.30**	**1.14-1.50**	**0.0002**

4 Discussion

This study examined risk factors and patterns associated with physical restraint use among children and youth in inpatient and community mental health settings in Ontario. Several key findings emerged. First, externalizing symptoms was most strongly associated with restraint use, with children exhibiting high levels showing over six times greater odds of experiencing restraint, and children exhibiting moderate levels showing over three times greater odds of being restrained. Second, living with nonrelatives excluding foster families, and requiring transition supports were associated with restraint use. Third, internalizing symptoms, a

diagnosis of autism, and risk of suicide and self harm were associated with physical restraint. Given our study's large sample size, emphasis should be placed on the magnitude of associations (e.g., odds ratios) rather than on statistical significance alone, to better understand the relative contribution of each risk factor.

These findings are consistent with existing literature which suggests that children with externalizing symptoms have been identified as most at risk of being physically restrained [31]. Studies have found that high internalizing symptoms and risk of suicide and self harm are associated with restraint use as well [3,12,18,23]. These findings suggest a potential pattern of behavioural and emotional dysregulation that may contribute to restraint use.

Furthermore, living with nonrelatives, requiring transition supports, and high caregiver distress were found to be associated with restraint use, suggesting a pattern of care environment instability within our sample. The need for transition planning often arises in the context of family breakdown, including high levels of caregiver distress and reduced caregiving capacity. When these circumstances arise, children may be placed in residential care or group home settings, which results in transitions to new homes and educational settings [60,61]. Research suggests that children and youth may become distressed during transitions of this nature, which may be associated with increased emotional dysregulation and increased likelihood of restraint use [14,62,63].

With respect to sex, children who experienced physical restraint in our sample were predominantly male. This aligns with existing literature which indicates that males are more likely to be physically restrained than females [3,16,18]. Further, our study revealed that children who were younger in age (aged 4-11) experienced higher levels of restraint than older youth (aged 12-15), which is consistent with existing research [11,16,18,20,29]. Younger children are often reported to exhibit higher levels of observable physical behaviours than older children, which may explain their increased rates of physical restraint [5,17]. It is also likely that their smaller physical size may influence how restraints are applied in practice.

In our sample, 3.2% of children and youth assessed using the ChYMH, and 16.0% of children and youth assessed using the ChYMH-DD, experienced a recent physical restraint. Given that the ChYMH-DD is specifically designed to assess children with developmental disabilities, this suggests that children with developmental disabilities may experience physical restraint use at a higher rate than their peers without developmental disabilities. However, differences in service settings, severity of clinical presentations, and staff reporting practices may contribute to this finding, so higher rates of physical restraint should not be attributed solely to developmental disability. Moreover, having moderately to severely dependent cognitive skills was associated with restraint use in our sample. Previous research suggests that individuals with severe to profound

intellectual disabilities and dependent cognitive skills experience frequent restraints [3,25,56]. Children and youth with developmental disabilities may have different communication needs, which may be associated with higher rates of restraint. Moreover, staff perceptions of behaviours among children with developmental disabilities may shape their response to distress [57-59], potentially contributing to increased rates of restraint in this population. This highlights the importance of educating care and service providers on the unique needs of children with developmental disabilities and appropriate de-escalation techniques.

Finally, among children and youth in our sample who recently experienced restraint use, reactive attachment disorder, ASD, schizophrenia and other psychotic disorders, and substance use disorders were the most common provisional diagnoses. These findings are consistent with existing research which suggests that having a formal diagnosis predicts restraint use [3,11,14,16,19,23]. ASD, attachment disorders, and substance use disorders have been associated with restraint use across numerous studies [19,23,26,28,30]. Multimorbidity was also found to be common in our sample. These findings suggest a pattern of clinical complexity that may be associated with restraint use.

4.1 Limitations and Future Directions

Although this study has numerous strengths, certain limitations should be acknowledged. First, given that this study analyzed cross-

sectional data, claims about causation cannot be made. Future research on this topic should be longitudinal in design to allow for causal relationships to be drawn. In this study, physical restraint use was measured as a binary yes/no occurrence in the past three days, which limits the ability to capture frequency or patterns over time. Collapsing multiple physical restraint measures (e.g., wrist, bed, and manual restraints) into a single binary variable may obscure important differences in their use, context, and severity, thereby limiting clinical interpretation. Future studies should consider assessing both restraint frequency and form of physical restraint across multiple time points, to better understand longitudinal patterns.

Additionally, although key confounding variables (e.g., age, sex) were controlled for, other potentially relevant factors such as racial background and staff stress levels [35,22] were not included. Examining these variables in future studies could help clarify their role as potential risk factors for restraint use. Moreover, the Provisional Diagnostic Categories variable was based on clinician-assigned provisional categories rather than standardized research diagnoses. The dichotomization of these variables (presence/absence) may have resulted in a loss of information regarding diagnostic severity or relative importance, potentially reducing meaningful differences between groups.

It should be noted that our analyses did not account for potential clustering by institution which may have resulted in an underestimation of standard errors. Moreover, variables included in the regression model were

derived from the same assessment instrument and may share conceptual similarities and underlying measure variance. As such, findings should be interpreted with consideration of the potential interrelated nature of these constructs. Finally, while this study's population was a large and comprehensive sample of treatment-seeking children and youth, it was limited to participants in Ontario, Canada. Therefore, findings may not be generalizable to other provinces in Canada and international regions. Future research should examine clinical populations in other diverse regions and consider variation in institutions to evaluate the consistency of these results within diverse cultural, social, and healthcare contexts.

4.2 Implications for Clinical Practice

Findings from this study provide researchers and clinicians with important insights into risk factors for physical restraint use among children and youth in inpatient and community health settings. These findings can be used to inform the development of targeted prevention and early intervention programs to reduce the need for physical restraints and promote safe and supportive care. Moreover, findings can be used to identify children and youth who are at risk of being physically restrained, thereby enabling timely implementation of de-escalation strategies, prevention, and early intervention efforts. Using a standardized assessment tool such as the interRAI ChYMH can assist clinicians and mental health professionals in identifying children at elevated risk and in developing targeted care plans. As our study indicates that children with

developmental disabilities and severely dependent cognitive skills may experience high rates of restraint, clinicians should consider using the ChYMH-DD to assess children and youth when appropriate. The ChYMH and ChYMH-DD are evidence-informed and accessible assessments that not only identify children at risk of being restrained, but also trigger the embedded *Control Intervention CAP* [1,64,65]. This CAP provides best practice guidelines for de-escalation and minimizing the use of restraints to reduce the likelihood of future control interventions.

Given that physical restraint was most prevalent among males and younger children in our sample, clinicians should consider potential implications of sex and age differences when making care planning recommendations. Research suggests that both males and younger children may be perceived as more aggressive by staff members [17,66], which may explain the higher rate at which they are restrained. Inpatient and community health settings should ensure that staff members are trained to recognize bias and apply trauma-informed, age-appropriate approaches to reduce use of physical restraint. Furthermore, some children may have a diminished capacity to reason and communicate due to impaired cognitive decision-making abilities. In these situations, clinicians should utilize individualized, trauma-informed, and developmentally appropriate behavioural supports such as environmental modification and communication aids to facilitate communication and reduce distress, minimizing the need for restraint use [67-69].

Considering our study found that requiring transition assistance may be associated with physical restraint use, clinicians should utilize the CAPS embedded in the interRAI ChYMH and ChYMH-DD assessment system to integrate care plans to reduce distress and prevent the escalation of behaviours that may lead to physical restraint. Given that high levels of caregiver distress were found to be associated with restraint use, transition planning and support strategies should address the unmet needs of family members through appropriate supports such as respite care.

Given that experiences of physical abuse and trauma are associated with physical restraint use [37,70], it is essential that clinicians and mental health providers provide trauma-informed care. Implementing trauma-informed care strategies have been found to reduce the use of restraints in child and adolescent psychiatric settings [23]. Children and youth who have experienced trauma are likely to be triggered and re-traumatized by being physically restrained [39]. Staff members in community and inpatient mental health facilities should be trained to understand the effects of trauma on children and youth to help prevent re-traumatization and reduce the use of physical restraints.

Children and youth's experiences with restraint use are abundantly negative with many experiencing physical and psychological harm as a result [17,40,41]. Consequently, staff members at mental health facilities should receive rigorous training to reduce the misuse of restraint and minimize harm to children and youth when restraints are needed. Prior to

crisis events, staff members should work to create positive relationships with populations that are at high risk of being restrained (e.g., children with developmental disabilities, mental health diagnoses, histories of trauma) and consider emotional regulation training to control emotions in high-stress situations [24]. Furthermore, staff members should be trained to effectively communicate when explaining restraint procedures and debriefing children and their families after restraint has occurred [71,72].

Moving forward, it is important to prioritize de-escalation techniques when children and youth are in distress and to implement preventative measures that reduce the need for use of physical restraint, minimizing the potential for trauma and harm. Additionally, a standardized assessment-to-intervention approach is needed to support high-risk children across service sectors by identifying trauma early on to avoid re-traumatizing children and youth with use of physical restraints. Professionals across service sectors should consider using the interRAI suite of instruments to support cross-sector coordination, facilitate identification and prioritization of needs, and enhance evidence-based care planning to ensure coordinated support for at-risk youth.

5 Conclusions

This study found that high levels of externalizing symptoms was most strongly associated with physical restraint use among children and youth in community and inpatient mental health settings. Internalizing symptoms,

risk of suicide and self harm, living with nonrelatives, and requiring transition supports were also strongly associated with physical restraint use. Moderately to severely dependent cognitive skills and high caregiver distress were found to be associated with restraint use among children and youth as well. In our sample, males and younger children experienced high rates of physical restraint. Furthermore, physical restraint use was most common among children and youth with reactive attachment disorder, autism spectrum disorder, schizophrenia and other psychotic disorders, and substance-related disorders. Findings provide researchers and clinicians with important insights into risk factors for physical restraint use among vulnerable children and youth, which can be used to inform care planning and the development of targeted prevention and early intervention programs. This research highlights the importance of identifying traumatic experiences, providing trauma-informed care, and using a standardized assessment-to-intervention approach across service sectors to reduce the use of physical restraints in child and youth mental health settings.

List of abbreviations

ChYMH: the interRAI Child and Youth Mental Health Assessment; **ChYMH-DD**: the interRAI Child and Youth Mental Health Assessment for Children and Youth with Developmental Disabilities; **ASD:** Autism Spectrum Disorder; **CAP(s)**: Collaborative Action Plan(s); **RISsK algorithm:** Risk of Suicide and Self Harm in Kids algorithm.

Declarations

Ethics approval and consent to participate

The study involving humans were approved by Western University Research Ethics Board. The study were conducted in accordance with the local legislation and institutional requirements. This study utilized deidentified secondary data. Written and informed consent was obtained by participants' legal guardians/next of kin by agencies as part of standard care.

Consent for publication

Not applicable

Availability of data and materials

The datasets analyses during the current study are not publicly available due to interRAI licensing and data sharing agreements. Requests to access these datasets should be directed to the corresponding author.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

SS: Conceptualization, Data curation, Methodology, Writing – original draft, Writing- review & editing. AD: Writing – original draft, Writing – review & editing. DF: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology.

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