

# The Use of Splints for Behavioural Control



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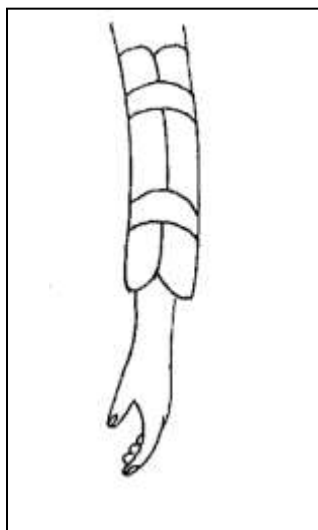
# Introduction

- The Disability Act 2006 (Victoria) defines mechanical restraint as **the use, for the primary purpose of behavioural control of a person with a disability, of devices to prevent, restrict or subdue a person's movement** but does not include the use of devices (a) for therapeutic purposes; (b) to enable the safe transportation of the person
- A splint refers to any device that is applied or worn, in original or modified form; to a body joint (usually the elbow) which restricts movement of that joint in any way, for the purpose of controlling behaviour
- Reductions in the use of mechanical restraint is a focus of the Office of the Senior Practitioner in 2010-2011

# Examples of Splints Reported in the Literature



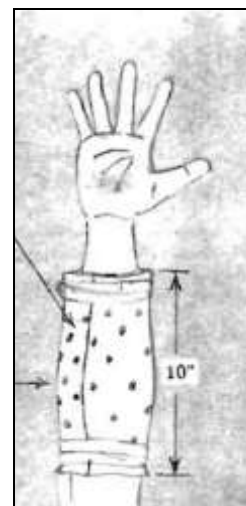
Babuccu et al. (2002)



Bumin et al. (2002)



Sharpe (1992)



McClure & Holtz-Yotz (1991)



Ball et al. (1985)

# Introduction

- Historically been applied prevent self-injurious behaviour and minimise the injury that may result from **SIB** (Kahng et al., 2008; O’Rielly et al., 2003)
- Splints substantially compromises an individual’s quality of life and consequently warrants intervention (Oliver et al., 1998)
- The basis is response restriction (Canella et al., 2006) without introduction of alternative behaviour
- Do not address functional influences that may set the occasion for, or reinforce, the behaviour of concern (Luiselli & Waldstein, 1994)
- Minimal evidence about the efficacy of splints
- Physical and psychological health implications
- Human rights (Carter & Wheeler, 2005) and ethical considerations (Canella-Malone et al., 2008)

# Case Reports of Splint Use for Behavioural Control

Author	Gender	Age	ID	Other Diagnoses	Behaviour	Function	Arm
Canella-Malone et al. (2008)	Male	10	Profound	Cerebral palsy, hydrocephalus	Hand-mouthing	Attention	Bilateral
Luiselli (1991)	Female	18	?	Down syndrome, seizures, vision impairment	Eye-pressing	Sensory	Bilateral
Yang (2003)	Female	14	Profound	Microcephaly	Scratching face	Attention	Bilateral
Irvin et al. (1998)	Female Female	25 41	Profound Profound	? ?	Hand-mouthing Hand-mouthing	Non-social Non-social	? ?
Luiselli & Waldstein (1994)	Female	10	Profound	Hydrocephalus, seizures, scoliosis, vision impairment	Hand-mouthing	Sensory	Left*
Favell et al. (1978)	Female	15	Profound	?	Eye poking, scratching	?	Bilateral
Johnson et al. (1994)	Male	7	Severe	ASD	Face punching, head-slapping	?	Bilateral
Ball et al. (1980)	Female	22	Profound	?	Finger sucking	?	Bilateral
Kahng et al. (2008)	Male	16	?	?	Head-hitting, pinching head & neck	Idiosyncratic	Bilateral
Lewis et al. (1981)	Male	10	?	?	Thumb sucking	Sensory	Single
O'Reilly et al. (2003)	Male	27	Profound	DS	Head-hitting	Sensory	Bilateral
Powers et al. (2007)	Female	16	Moderate	Cerebral degenerative chorea	Face punching	?	Bilateral
McClure & Holtz-Yotz (1991)	Male	13	Severe	ASD	Pinching, biting, rubbing of face and body	Sensory	Bilateral
Ball et al. (1985)	Male	11	Low Av.	Lesch-Lyhan syndrome	Finger biting	?	Bilateral
Oliver et al. (1998)	Female Male Female	25 32 29	Profound Severe Severe	Vision impairment, hearing impairment Down syndrome ?	Head punching Face slapping Face punching and hair pulling	? ? ?	Bilateral Right Bilateral

# Splint use in Victorian Disability Services

**Table 3.** Number of people subjected to different types of mechanical restraint in 2007-2008 and 2008-2009.

Restraint Type (not mutually exclusive)	2007-08		2008-09	
	Count	Percentage	Count	Percentage
Belts/ Straps	37	24%	33	24%
Bolsters	3	2%	2	1%
Cuffs	4	3%	7	5%
Gloves	14	9%	9	7%
Harnesses	28	18%	23	17%
Sheets	1	1%	3	2%
Splints	24	15%	21	15%
Other Restraints	105	69%	73	54%
Total People Receiving Mechanical Restraint	153	100%	136	100%

- 13 questionnaires (12 x SIB)
- 6M (mean age = 27), 7F (mean age = 30)
- Average number of years splint used = 6
- 4 people also subject to chemical restraint
- 7 cerebral palsy, 6 vision impaired, 4 epilepsy
- Sensory Assessment = 3
- Communication assessment = 3 (non verbal = 8)
- Functional Behaviour Assessment = 2
- Behaviour Support Plan = 5

# Interventions for Self-Injurious Behaviour Associated with Splint Use

Author	Gender	Age	Intervention Part 1	Intervention Part 2
Canella-Malone et al. (2008)	Male	10	Introduction of curricular materials	Response-contingent interruption (brief hands-down physical restraint)
Luiselli (1991)	Female	18	Fading of splints to mittens and then to gloves	Fading of glove by physical modification
Yang (2003)	Female	14	Extinction using petroleum jelly and short finger nails	Guided manipulation of activities
Irvin et al. (1998)	Female	25/41	Measurement of response effort	Increase flexion of splint to allow adaptive behaviour
Luiselli & Waldstein (1994)	Female	10	Oral-motor desensitisation	Response-contingent interruption (brief hands-down physical restraint)
Favell et al. (1978)	Female Female	15 27	(1) Fading by increasing periods out of restraints (2) Fading by increasing periods out of restraints	Sensory activities Firm pressure applied to arms by staff then faded
Johnson et al. (1994)	Male	7	Fading by increasing periods out of restraints	DRO (verbal praise and food) and brief hands-down physical restraint
Ball et al. (1980)	Female	22	Fading by reducing air pressure (sensor apparatus)	DRO using preferred food
Kahng et al. (2008)	Male	16	<i>Only functional analysis</i>	
Lewis et al. (1981)	Male	10	Introduction of splint	Fading not completed
O'Reilly et al. (2003)	Male	27	Removal of splints	Vibration and sound activities
Powers et al. (2007)	Female	16	Splints maintained	Non-contingent access to preferred stimuli (toys)
McClure & Holtz-Yotz (1991)	Male	13	Increased flexion of splints, fade to foam pads	Fade to elastic bandages, sensory activities
Ball et al. (1985)	Male	11	Introduction of flexible splints	"Positive reinforcement"
Oliver et al. (1998)	Female Male Female	25 32 29	(1) Fading by increasing flexion (2) Fading by increasing flexion (3) Fading by increasing flexion	(2) Reduction in the length of the splint

# Splint Use in Specific Populations

## Rett's Syndrome

- Contingent interruption superior to splinting (Paisley et al., 1993)
- Emergence of movements of the trunk and of teeth grinding (Bumin et al., 2003) and anxiety (Bumin et al., 2003)
- No lasting effect on stereotypic behaviour (Naganuma & Billingsley, 1988; Sharpe & Ottenbacher, 1990; Sharpe, 1992; Tuten & Miedaner, 1989)
- Benefits cannot be generalised to Rett's syndrome population as a whole (Tuten & Miedaner, 1989)
- Isolated cases of improved hand skills using splints however these have also included intensive occupational therapy at the same time (Kubas, 1992)

## Cleft Lip and Palate

- No consensus
- Distress to children and parents (Oxley, 2001)
- May contribute to motor weakness in children (O'Riain, 1977)

## Other

- Restricted use of less-involved hands in cerebral palsy (Crocker et al., 1997)
- Constraint-induced movement therapy in hemiparesis (Dickerson & Brown, 2007)
- Wrist flexion contractures (Jordan et al., 1999)

# The Problem with Splints: Behavioural Perspective

- Reduce the chance of other behavioural interventions and eliminates most sources of positive reinforcement (Paul & Romanczyk, 1973)
- Arm splints are often used as continuous restraint, which is not contingent on the behaviour of concern being exhibited (Matson & Boisjoli, 2009)
- They are aversive, punitive and intrusive (Yang, 2003)
- Loss of meaningful social relationships and personal autonomy (Obi, 1997)
- Reduced participation in ADLs and PCAS (Kahng et al., 2008)
- Restricted adaptive functioning (Irvin et al., 1998; Obi, 1997; Powers et al., 2007; Wallace et al., 1999)
- Limit benefit from therapeutic services (Fisher et al., 1997)
- Behaviours may be maintained by access to splints themselves (Kahng et al., 2008)
- Self-restraint may develop if splint is withheld (Oliver et al., 1998)
- Self-injury usually returns immediately when the splint is removed (O’Rielly et al., 2003)

# Risks Associated with Splint Use

- Tissue breakdown (Ball et al., 1980; 1985)
- Impaired blood circulation (Ball et al., 1980; 1985)
- Dislocation of joints (Fisher et al., 1997)
- Muscle atrophy (Powers et al., 2007)
- Pressure sores (McClure & Holtz-Yotz, 1991)
- Restricted range of motion (Ball et al., 1985; Irvin et al. 1998)
- Skin irritation (Ball et al., 1980; Jordan et al., 1999)
- Abrasions (Ball et al., 1985)
- Motor weakness (Oxley, 2001)
- Bone demineralisation, shortening of tendons and arrested motor development (Lovass & Simmons, 1969)
- Soft tissue problems from larger arc of motion of shoulder (Cooper et al., 1993)
- Distress (Oxley, 2001) and agitation (Ofoegbu & Playfor, 2005)
- Delayed psychological development (Harris, 1996)
- Psychological injury (O'Riain, 1977) including PTSD (Ofoegbu & Playfor, 2005)
- Long-term risks for children are unknown (Effgen & McEwen, 2008)

# Summary

- The type of behaviour, its severity, the length of time the splint has been used, the age of the person and their cognitive level may all be instrumental in determining treatment effectiveness (Gorman-Smith & Matson, 1985)
- There is a dearth of research concerning people with multiple disabilities who injure themselves severely through self-biting, chronic hand mouthing or interfering with open wounds or enteral feeding tubes who are at high risk of long-duration restraint (Sturmey, 1999)
- Measurement of response effort ensures the minimum amount of joint splinting required and maintains adaptive behaviour (Wallace et al., 1999; Zhou et al., 2000)
- Need to consider all possibilities for fading, either directly from the splint or with an intermediary device, for example, a glove (Luiselli, 1991) or wrist weights (Van Houten, 1993)
- People with severe and profound disabilities already have limited levels of adaptive ability which is dramatically compounded by the use of splints
- ... *By eliminating restrictions, [people with disabilities] have a greater likelihood of acquiring meaningful skills, engaging purposefully with their surroundings, avoiding untoward physical effects and, as a result, experiencing a richer quality of life* (Luiselli & Waldstein, 1994: 364)

# Recommendations

1. Splints should not be the first-line intervention for self-injurious behaviours
2. Functional behaviour assessment or functional analysis must be undertaken with the splints off
3. Assessment of the person's sensory preferences should be undertaken by an Occupational Therapist
4. The person must have a formal way of communicating as indicated by an assessment by a Speech Pathologist
5. A physical health basis for the onset of self-injurious behaviour should be excluded
6. Splints should only be used contingent on behaviours and should be based on measurement of response effort
7. There is no evidence for the standard use of splints in particular diagnostic groups (e.g. Rett's, Lesch-Nyhan)
8. Standard behavioural interventions should be attempted - fading appears to be the most successful
9. Monitoring for exacerbation of existing health co-morbidities and the development of adverse health complications must be conducted regularly
10. Range of motion exercises on the splinted joint must be performed at least daily or as recommended by a clinician

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