

Considering sensory processing issues in trauma affected children: The physical environment in children's residential homes

Christopher Robinson and Alicia Madeleine Brown

Abstract

Sensory processing issues are generally considered to be clinically significant in children who have suffered abuse and trauma and much has been written about the possible neurological correlates of such sensitivities (De Bellis and Thomas, 2003; van der Kolk, 2014). Comparatively little focus has been given to the functional aspects of these sensitivities, and particularly how these might interact, in context, with a child's underlying neurological vulnerabilities. In this respect, the environment surrounding the child is a neglected area of significant, perhaps critical, importance. In terms of potential hypersensitivity to environmental stimuli, children with Autistic Spectrum Conditions (ASC), although with different aetiological correlates to trauma affected children, are known to face profound environmental challenges. Children with ASCs have received a wealth of attention in the literature with regard to these sensory challenges, whereas, in contrast, trauma affected children have received very little direct attention at all. It is the aim of this paper to focus on the environmental aspects of sensory processing in trauma affected children, specifically in relation to the physical environment of children's residential homes.

Keywords

Sensory processing, environment, looked after children, trauma

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Corresponding author:

Dr. Christopher Robinson, Consultant Clinical Psychologist, Halliwell Homes, Head Office: 42 Technology House, Lissadel Street, Salford, M6 6AP

chris.robinson@halliwellhomes.co.uk

Introduction

This paper looks at the potential importance of physical environments and how these might helpfully be modified to take account of the sensory sensitivities of children who have suffered trauma, therefore aiding their recovery. It does highlight some research into how trauma affected children come to acquire such sensitivities, and why therefore sensory and environmental issues are important, but it is by no means an exhaustive review. Similarly, this paper is not aimed at those at the forefront of what is a growing area of research. Rather, it is intended to raise awareness of the potential importance of sensory and environmental issues in helping trauma-affected children to recover. The paper also describes the use of a survey tool, originally developed for use with autistic children, to investigate environments at a sensory level.

Trauma processing

Memories of traumatic events can be both explicit and implicit: the former referring to memories that generally stem from what a person consciously thinks about, as in verbal form, whereas the latter is more of an automatic, unconscious memory. During the experience of trauma, biological reactions impact upon sensory processing and the way in which memories are encoded. Heightened sensory awareness can mean that environmental features, which might otherwise have gone unnoticed, can become powerfully imprinted as associations with traumatic events. For some, this response is encoded as explicit memories where the person can make sense of their responses and understand it through narrative (Briere, 2002; Rothschild, 2000), whereas for others, the traumatic memories can become fragmented into visual, sensory and emotional pieces causing implicit memories and drives. Such fragmentation can mean that memories appear as disjointed images, physical sensations and intense emotional reactions (van der Kolk, 2014).

The dissociative experiences that often accompany traumatic events can themselves disrupt memory encoding at an explicit level, leading to sensory associations with no accessible verbal narrative. It has been suggested that this is due in part to the reduced activity in Broca's area during trauma, leaving the memories devoid of any narrative and left in the limbic structures 'like a somatosensory photograph' (Koomar, 2009, p. 1) (van der Kolk, 1996b; Ogden, Minton, and Pain, 2006; Rauch et al., 1996; Rothschild, 2000).

Developmental Considerations

Much of the research in this area is derived from studies of adults presenting with symptoms of Post-Traumatic Stress Disorder (PTSD). When considering children, it is important to bear in mind that many may have suffered chronic abuse over many years and a diagnosis of PTSD may not capture their pervasive clinical presentations (van der Kolk, 2003).

In general, it is accepted that at birth the amygdala is well developed, with it taking much longer for the hippocampus and cortex to mature fully. It is these latter two areas that are involved in sequencing and providing context to information (Rothschild, 2000). Therefore, at the point at which trauma occurs for a child, their brain may be mainly functioning at a pre-verbal level, where memories may inevitably be encoded as implicit, unconscious and primarily sensory in nature (Briere, 2002; Perry and Szalavitz, 2006). For this reason, sensory rather than explicit trauma associations, such as: the smell of the perpetrator; noise related to impending abuse; specific colours that were visible during harm – all may cause implicit sensory recollections and conditioned emotional responses (Briere, 2002). The emotional and behavioural reactions that develop in relation to these unconscious triggers often cause trauma affected children to be mislabelled as challenging, defiant or aggressive (Streeck-Fischer and van der Kolk, 2000).

Predictive Adaptive Responding

Children who have been subject to chronic and inescapable abuse may also have general problems with self-regulation, having not been given the safe environment in which to develop any secure sense of self, let alone establish effective internal coping strategies. As such, the child's more primitive avoidance strategies, such as fight, flight or freeze may have developed into their predominant response modes (Briere, 2002). Children who have been chronically abused may also have problems re-calibrating their arousal levels contributing to their environmental sensitivity (van der Kolk, 2003). A mechanism that brings these factors together, the Predictive Adaptive Response (PAR), is attracting progressively more research interest, not least because of the long-term pervasive health implications, which have been shown to have lifelong consequences.

The PAR is established during early development, when neural circuitry and peripheral regulatory systems are programmed to achieve optimal fit with ecological demands. The PAR is described as being like an embedded weather forecast that programmes expectation of living conditions. It has survival benefits, but it can be skewed in unhelpful ways by adverse developmental conditions (Evans and Kim, 2012).

Children who have experienced a lack of parental warmth, inconsistent and unresponsive parenting and abuse can be described as suffering from *toxic childhood stress* (Carroll, Gruenewald, Taylor, Janicki-Deverts, Matthews and Seeman, 2013). Exposure to *toxic childhood stress* impacts upon PAR to increase allostatic load. This in short means that these children are more sensitive to environmental stress and have a greater reaction to it, for a longer period of time. This increased sensitivity to environmental stress has been the subject of much interest in terms of epidemiological impact on physical health and

development, but has been relatively neglected in terms of cognitive and more general psychological development, even though its importance is fairly well established (van Ijzendoorn and Bekermans Kranenburg, 2012).

The physical environment of a children's residential home is the context in which children who have suffered the most serious forms of *toxic childhood stress* are often removed to. It is also the context where their established vulnerabilities give rise to behaviours and emotions that challenge carers and often compound earlier traumas. It should be no surprise that a lot of these children are extremely susceptible to environmental pressures, even those that are objectively quite subtle. It may well be the case that explanations for the way these children present can be found in past events, but those same events have often fundamentally impacted on how they perceive and experience the present day context in which they find themselves.

These children are living with established vulnerabilities and often intense susceptibilities and it should be recognised that their recovery could be impacted on by all aspects of their lived experience. Environmentally, this means establishing a context that addresses both the explicit and the implicit aspects of complex conditioned responses and memories. Many recovery programmes are designed to address what can be accessed explicitly through the narrative of various therapeutic approaches. Some use art or play therapy as a discrete means of helping children reach feelings that cannot be put into words. But to be truly therapeutic a recovery programme must also address the environment in which the child's lived experience takes place. Research is increasingly telling us that we should take account of sensory issues if we are to address the reality of trauma memory and how it impacts upon a child's world.

As noted previously, the particular importance of environment in children with ASC is already well recognised. It is known that the environment can be crucial, as people with ASC often present with unusual responses to sensory stimuli (Bogdashina, 2003). They can be hypersensitive to some stimuli which leads to anxiety and avoidance and hyposensitive to others which can lead to unresponsiveness and sensory seeking behaviours. Similarly to trauma affected children, if these sensory driven behaviours are not properly understood, they can be misinterpreted as purely challenging and managed inappropriately.

Environments for autistic children are often designed and maintained with the sensory sensitivities of their users in mind. The aim is most often to achieve a neutral background and reduce harsh sensory inputs without compromising the availability/accessibility of the overall context (Gaudian, Hall, Myerson and Pellicano, 2015).

Assessing the environment in therapeutic children's homes: The survey

Henry Maier's work in the 1980s addressed the spatial design elements of care environments for children and how these interacted with and shaped the social living experience. Maier also spoke of the 'rhythms of care' and the importance of consistency and dependability – in terms of interactions and environment (Maier, 1981). These elements are particularly important when one considers that many children come into residential homes from abusive chaotic homes, where predictability of any sort may have been absent.

However, to date few papers have centrally focused on the importance of the physical environment, particularly its sensory elements, in children's residential homes, albeit a critical part in every aspect of a child's life in care (Bailey, 2002).

Bogdashina (2003) developed a Sensory Profile Checklist (SPC), which is widely regarded as an essential starting point in understanding how individuals with ASC relate to sensory issues and therefore how best to provide an environment that will not only enhance engagement, confidence and understanding, but also reduce behavioural problems which are often sensory driven. From this, Simpson (2009) developed an Environmental Checklist for ASC, which utilises the SPC criteria to look at the overall environments rather than individual needs (Simpson, 2009). It is this checklist that we have adapted and employed to structure observations of three residential children's home environments. As previously mentioned, trauma affected children can be hypersensitive to the environment in different ways depending on their prior experiences. These sensory sensitivities may be at a conscious or unconscious level and therefore the checklist makes recommendations globally on how to neutralise the physical environment of the homes to reduce arousal levels.

The Environmental Checklist is split into 3 sections: sensory, escape and other. The sensory section is further sub-sectioned into tactile, visual, olfactory, auditory and vestibular systems.

The table below details the specific items on the checklist, which require a yes or no response and further qualitative expansion. Once completed, it is the analysis of each category that informs how the environment can be adapted to minimise hyperarousal and to help a child to accurately perceive incoming stimuli.

Considering sensory processing issues in trauma affected children: The physical environment in children's residential homes

Table 1. The Environmental Checklist for children's residential homes adapted from Simpson (2009).

1. SENSORY - Touch/tactile questions		YES/NO	COMMENTS
1.1	Are there sensory materials available for the children to play with in the background? E.g. toys, games, play objects, televisions. Are there a variety of materials and enough for each party who seeks sensory stimulation?		
1.2	Are there opportunities for soft play/rough and tumble for children to access? Consider how often and whether the opportunities are appropriate.		
1.3	Are there spaces where the children can go if they wish to be away from the group? Consider if furniture positioning could facilitate this.		
2. SENSORY - Sight / Visual questions		YES/NO	COMMENTS
2.1	Are the colours in the background low arousal, such as cream and pastel shades and not red or vibrant. Consider whether all rooms /spaces need a change of paint or wallpaper.		
2.2	Is the background cluttered with furniture?		
2.3	Does the background have fluorescent or harsh lighting rather than dimmable or subtle lighting		
2.4	Is there sunlight from windows or skylights?		
3. SENSORY - Smell / Olfactory questions		YES/NO	COMMENTS
3.1	Does the paint or wallpaper paste smell? Are there other background smells?		
3.2	Does the environment smell of cleaning materials e.g. polish, air fresheners?		
3.3	Does the environment smell of individuals (including pets) using the background? (e. g. deodorants, perfume and aftershave).		
3.4	Do smells drift around the building from room to room?		

Considering sensory processing issues in trauma affected children: The physical environment in children's residential homes

4. SENSORY - Hearing / Auditory questions		YES/NO	COMMENTS
4.1	Is there a general noise level in the background?		
4.2	Have people with hypersensitive hearing been considered with respect to specific noises that may irritate, such as clocks ticking, humming from lights, road noises or building/gardening work in the distance?		
4.3	Is there noise from flooring and can this be deadened?		
4.4	Are there different noise levels at different times of the day?		
4.5	Have you any specific silent areas?		
5. SENSORY - Balance / Vestibular questions		YES/NO	COMMENTS
5.1	Is the background appropriate for children who seek movement (e.g. Lots of space, soft play, swings, trampoline)?		
5.2	Are there opportunities to go indoors and outdoors?		
Escape questions		YES/NO	COMMENTS
1.1	Is there a system to know when a child needs to escape from a situation?		
1.2	Is there room /space for escape?		
1.3	Is this room /space used solely for this purpose?		
1.4	To what extent is this room / space low stimulus and safe?		
1.4	1.5. Is there an alternative to the escape room / space (e.g. the garden)		
Other questions		YES/NO	COMMENTS
1.1	Can changes be made to the sensory background? (e.g. Are there practical or financial limitations)		
1.2	To what extent is the background safe for the children?		

Findings and Recommendations

The above adapted checklist was used to survey the physical environment in three residential children's homes specialising in the recovery of children who have suffered trauma. The same assessor completed the surveys over a period of three weeks.

The main findings and recommendations of how to improve the environments from the surveys are summarised below. Some recommendations incurred no cost and others required more financial outlay.

SENSORY: 1. Touch/tactile

There were a variety of toys available to the children in all three homes. Two of the homes had quiet lounge areas as well as TV lounges. Access to outside play areas was easily available in all three homes, although these were sometimes cluttered.

Recommendations were made to keep each space clear and to maintain the distinction between each area, so, for example, no audio-visual equipment in the quiet lounge areas.

In addition, each house was provided with a box of tactile, sensory toys and materials which was kept in the quiet lounge areas.

The garden areas in each home were also bounded by fences, which gave a sense of safety and containment.

SENSORY: 2. Sight/Visual

All three homes had an array of different coloured walls, some bright and some dark. For example:

House A: 'The hallway has been painted in a bright lemon yellow colour and may benefit from a more neutral colour'.

House A: 'The office walls are painted a shade of blue on top of the woodchip wallpaper which makes the room appear dark'.

House B: 'The walls are white and extremely cluttered with papers/signs and certificates on the walls. The walls are in need of decoration'.

Therefore, based on the findings of the survey, recommendations were made to repaint all the walls in low arousal creams in order to neutralise some of the brighter colours and make others less dark. It was also suggested how pictures should be put in photo frames and safely attached to the walls.

With regard to background lighting in the homes, this appeared in general to be rather intrusive:

House B: 'The kitchen contains two double fluorescent strip lights, both of which have a broken strip and emits a harsh bright light as well as flickers'.

House C: 'None of the children's rooms contain any bedside lamps. They all have central ceiling lighting which can appear to be rather bright, especially if left on during the night'.

Advice was given to replace the harsh artificial lighting with lights with dimmer switches and guidance given on how best to utilise lamps in the bedrooms and communal areas.

SENSORY: 3. Smell/Olfactory

Across all three houses it was recorded that there were smells of perfume fragrances lingering in rooms:

House A: 'Perfume could be smelt in the hallway'.

In addition, smells from the kitchen were drifting between rooms:

House B: 'The kitchen is downstairs and the odours coming from it were filtering into all downstairs rooms'.

Staff were requested not to wear perfume while on shift and it was advised how doors could be kept shut to stop smells drifting between rooms.

SENSORY: 4. Hearing/ Auditory

It appeared evident from the surveys that in the houses where some of the areas had wooden flooring or thin carpets, this led to an overall increase in noise levels when the children were in the house:

House A: 'The lounge/dining area consists of wooden flooring and can become louder when the children are walking/running on it with shoes'.

House B: 'Noise could be heard, especially on the stairs, when the children were running up and down them. The area is carpeted with very thin carpet and noise levels may be reduced if the carpet was changed'.

House C: 'All of the flooring was carpeted, which considerably reduced the noise levels'.

It was suggested that the houses could replace carpets and line wooden floors with cushioned vinyl flooring for example, which would help to reduce noise further. In addition, advice to add more soft furnishings – cushions, rugs and beanbags – was given as these would help to further quell the reverberating sounds.

SENSORY: 5. Balance/Vestibular

The survey highlighted that although all three homes had ample outside space, they did not have satisfactory play equipment:

House A: *'There is a large external garden area, although it contains limited play equipment such as swings, trampoline and outdoor games'.*

House C: *'There is an external garden area, with one small activity centre. There is a lot of other space to play, but a lack of equipment'.*

All three homes were advised to purchase swings and a trampoline for the outside areas to aid children who require sensory input. Outdoor spaces were also made more easily accessible, whilst being contained and protected.

Escape

The survey made obvious that in all three homes there were no specific rooms made available for a child to escape to if they required time away.

House C: *'No specific rooms or spaces are available for escape, apart from the children's own bedroom'.*

Bartlett (1997, p. 20) stated the importance of 'stimulus shelters', which offer a refuge away from noisy, chaotic environments. While other researchers, including Curtis, Gesler, Fabian, Francis and Priebe (2007), have highlighted how outdoor space can be psychologically beneficial for a child to find a sense of calm. As a result, relaxation rooms (quiet lounges) were recommended for all of the homes, equipped with neutrally coloured, low sound creating fabrics and furniture and softer carpets.

Other questions

A number of changes were made to the sensory background as detailed above. These generally involved removing or toning down potentially overstimulating elements and thinking about the use and accessibility of particular areas.

Discussion

The adapted checklist used, although not statistically based, was a structured first attempt at surveying the environment of therapeutic children's homes from a sensory level with the aim of minimising stimuli that are over-arousing, be it consciously or unconsciously. Initial feedback has been positive from both children living in the homes and adults working in them. These impressions warrant structured evaluation in the future to help understand which features of a home environment may be most significant, and, of course, those that we have so far missed.

The aim of surveying therapeutic children's homes from a sensory perspective is to help achieve an optimum background environment by removing those features that, whilst unplanned and often unnoticed, can nevertheless have a significant sensory impact.

It is neither necessary nor useful to create 'clinical' spaces free of colour or of homely feeling light and furnishings. A children's home should be a place of nurture and there is a balance to be made between sensory neutrality and an environment that has a warm and welcoming feel. In our experience, this has not been too difficult to achieve. The homes do not look or feel sterile, but the air of relaxation they have is consciously achieved and monitored.

There are sound, although relatively under-researched, reasons to assume that most children living in residential care will have heightened sensory sensitivity issues. The cost in terms of surveying and adapting environments to account for this can be slight or substantial, but should not be prohibitive. The extent to which outcomes for children in care may be improved by making sensory adaptations to living environments is an area that warrants much greater interest.

Further research could usefully consider any long-term measured impacts of sensory informed environmental planning and management, but also the individual experience of children and how they perceive their living environment.

About the authors

Dr. Christopher Robinson is a consultant clinical psychologist who has worked with looked after children for many years. Miss Alicia Madeleine Brown is a trainee clinical psychologist at Teesside University. She has previously worked as an assistant psychologist within a CAMHS (child and adolescent mental health service) team for looked after children.

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