

INTERGENERATIONAL TRAUMA IN REMOTE AUSTRALIA AND PAPUA NEW GUINEA: A NEUROPSYCHOLOGICAL PERSPECTIVE

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Abstract

The problematic effects of intergenerational trauma are explored in the context of two population settings: in the remote Kimberley region of north-western Australia and in the highlands of Papua New Guinea. Particular attention is paid to the impact of traumatic experiences and the additional complicating factor of alcoholism on the developing as well as the adult brain. These effects are explored from a neuropsychological perspective, based on a wide array of research in this field and on current statistics. In the face of limited resources and inadequate access to professional help for these populations, interventions are suggested that could help to turn round the detrimental effects of trauma handed down from one generation to the next.

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Intergenerational trauma identified in localized areas of remote Australia and Papua New Guinea (PNG) could see the rise of a generation of severely disadvantaged and highly vulnerable individuals if no measures are put in place to halt the downward movement of a vicious cycle. The impact of trauma and its detrimental effect on similar remote populations in the Kimberley region of Western Australia (WA) and the highlands of PNG are discussed from a neuropsychological perspective.

The Kimberley

In the Kimberley region of remote north-western Australia, the use of alcohol leads to disinhibiting behavior and an increasing number of violent incidents, which in turn lead to trauma, avoidance behaviors, disrupted families, women raped, and children growing up in dysfunctional environments where many are not supported to attend school regularly. According to J. Radcliffe, a former principal at Kununurra High School (personal communication, May, 2015), just 60–70% (or less) of children actually attend school on any given day:

Average attendance is in the 70% range. Indigenous attendance, which accounts for 50% of the school, is at least 8% lower and is carried by the higher non-indigenous results Breaking it down further, of the indigenous students, about 40% attend over 90% of the time, meaning the remaining 60% of the indigenous cohort of approximately 450 students attend well below 60% of the time. Many are in the high-risk area below 30%. On any given day you would expect 60% of indigenous students to attend, often higher, but by varying degrees. Also, these students do well for a number of weeks, then simply stop coming for days/weeks on end. Reasons vary greatly. Funerals are a constant issue due to high mortality, significant interconnected relationships, cultural obligation and travel; students often are away for long periods of time, often with a [good] reason, but that does not change [that] they are simply not at school for a week or more.

Truancy programs are in place but have limited effectiveness when parents don't cooperate (Cordingly, 2014). Children often go to school without breakfast and roam the streets at night until well after midnight

because it is safer on the streets than it is at home. The attendance rates of indigenous and non-indigenous students were documented in a report by the Department of Education, Employment and Workplace Relations (Australian Government, 2013), as follows:

Information provided by the Western Australia Department of Education on its Schools Online website indicates that the attendance rates for all year groups in the region in 2012 is around 77%. For non-indigenous students the attendance rate is approximately 91%, while the rate for indigenous students in all year groups is about 68%. The attendance rate for primary schools in the region is 81%. The figure falls to 68% for secondary schools. The average attendance rate for all government schools in Western Australia was 92% for primary and 88% for secondary schools in 2012.

The Australian Human Rights Commission (2001) has previously reported on the poor literacy standards of indigenous students in remote, rural, and urban settings, as follows:

National breakdown. Although there was evidence that indigenous students in remote locations were at a particular disadvantage in terms of literacy and numeracy skills, such disadvantage was also found in rural and urban settings. In urban locations approximately 35% of indigenous primary school students had significantly lower literacy and numeracy achievement compared with approximately 43% in rural and remote locations. The percentage of other Australian students with significantly lower literacy and numeracy achievement levels was estimated at 16% in both urban and rural and remote locations. . . . *Literacy Standards in Australia* (Australian Council of Education Research, 1997) showed that in the National School English Literacy Survey, only 19% of Year 3 indigenous students and 23% of Year 5 indigenous students met the draft minimum acceptable standard for reading. For writing, only 29% of Year 3 indigenous students and 24% of Year 5 indigenous students met the draft minimum acceptable standard. . . .

Regional breakdown. In WA, the Education Department has reported that

'the overall performance of Aboriginal students is significantly lower in all learning areas, except physical education, when compared to the performance of non-Aboriginal students.' For example, in 1996, '83% of all Year 10 students met or exceeded the Level 4 MSE [Monitoring Standards in Education] requirements for mathematics skills compared to 37% of Aboriginal students' and in 1997 '91% of all Year students met or exceeded [that level] for reading skills compared to 75% of Aboriginal students' (Australian Human Rights Commission, 2001).

In addition to the above, an erosion of respect for elders, authority, and

(self-)discipline can be readily observed. The vicious cycle extends to the use of drugs and alcohol, more violence, and girls getting pregnant very early in life (as teenagers) without the capacity, either psychologically or financially, to look after their babies. There is little guidance available on how to parent for the next generation other than the learned behaviors of abusive language, violence, and resorting to alcohol and other drugs (e.g., marijuana) as a means of coping, coupled with an ever-increasing inability to problem solve effectively and creatively.

Fetal alcohol spectrum disorder in the Kimberley. Kavanagh and Payne (2014) found that one of the observable effects of alcohol consumption was the alarming rate of fetal alcohol spectrum disorder (FASD) in the Kimberley region and noted that educational level is the biggest predictor concerning knowledge of safe drinking practice during pregnancy. Further, on 19 January 2015, the ABC presented a report on the Lililwan Study, carried out during 2002–2003, which found that the nation's highest rate of fetal alcohol syndrome was documented in WA's Fitzroy Valley (Owens, 2015).

Looked at from a developmental cognitive neuroscience angle, alcohol intake during pregnancy can affect the developing brain of the unborn child in numerous ways. Mattson et al. (2008) highlight an overall decrease in brain size and anomaly of certain brain structures such as the corpus callosum, ventricles, and cerebellum; changes in brain shape and tissue distribution; and reduced size of the basal ganglia, in particular the caudate nucleus, which is known to have extensive connections to the frontal lobes. The authors of this study suggest, moreover, that "caudate volume reductions may lead to a disruption in frontal-subcortical circuitry . . . [which] may underlie a number of

neuropsychological deficits related to executive functions such as planning ability, concept formation, and fluency" (p. 641).

The effects of trauma on the developing brain.

Traumatic experiences have similar detrimental effects on the developing brain. For example, research has found that cortisol, a stress hormone, can affect the processes of neurogenesis, synaptic overproduction and pruning, as well as myelination in the brain. These effects are explained by Sandra Twardosz (2012) as follows:

High levels of cortisol can interfere with the myelination of corpus callosum axons by suppressing the division of the glial (support) cells that produce the myelin. This results in axons that are less efficient in conducting impulses across the brain hemispheres. Reduced corpus callosum area has been found in several regions of the corpus callosum for children who suffered neglect or sexual abuse compared with children who were admitted for psychiatric care but had not been abused or neglected and control group children. (p. 104)

Implications. From a neuropsychological perspective, the implications are far-reaching without intervention—but there is also hope if effective interventions are implemented. Since the groundbreaking research of Nobel Laureate, Eric Kandel, the brain can be understood as a neural network that is impacted both by nature and by nurture. In other words, brain function and consequent behavior are determined not only by genes but also by the environment. The experimental research that has resulted from this dynamic view of the brain, together with recognition of the importance of talking therapies in facilitating change (Rossouw, 2014), gives reason to invest actively in a psychotherapeutic approach to the problems described above.

Kandel (1998) identified five principles of brain functioning that have important implications for psychotherapeutic intervention. Principle 1 concerns the link between the brain and the environment and states that all mental processes, including disturbances in brain function, derive from operations in the brain. Principle 2 states that in the communication between neurons, as they build neural networks, genetic codes and their proteins play a significant role in managing behaviors, hence they have an important role in understanding the pathogenesis of mental illness. Principle 3 refers to the interconnection be-

tween genes and the environment, as genetic expression can change as a result of the interplay with the environment. Principle 4 concerns the effect of changes in genetic expression on neural wiring (patterns) which are responsible for the development of pathology. Principle 5—and this is the most exciting piece to the puzzle—proposes that through psychotherapeutic intervention, synaptic connections in the brain can be altered, effecting long-term changes in behavior.

That permanent changes can be effected in the brain through the use of psychotherapeutic intervention (i.e., talking therapies) has been demonstrated by Thomas Furmark and colleagues (Furmark et al., 2002). This signals a shift away from a neurochemical approach, where patients with mental disturbance are medicated as a feel good or sedating method, toward psychotherapy as an intervention that has the potential to fundamentally increase mental health and well-being on a neurobiological level.

The survival pattern of the brain, known to be activated under distress, tends to use the shortest way for protection—that is, to override more advanced cognitive functioning in the prefrontal cortex and revert to operating from the more implicit memory systems (brainstem, medulla and hypothalamus-pituitary-adrenal axis) to ensure survival (Tillfors et al., 2001). This phenomenon is evident when people are begging “just give me some space” rather than developing approach patterns that could help shift this cyclic behavior pattern. Repeated neural activation in this way will initiate the development of negative neural patterns, and the risk of psychopathology emerges. The goal is to assist people to down regulate the overactive survival patterns in their brain and encourage wider networks of brain activity that can enable effective problem solving and new patterns of behavior.

Papua New Guinea

The situation in the Kimberley has considerable overlap with the situation in Papua New Guinea, partly due to the close resemblance of both cultures and also due to the relative isolation of the populations. There are some common cultural aspects such as child rearing practices, and conflict resolution predominantly occurs through the use of violence. Rape is common and trauma processing is non-existent due to repeated exposure to stressful and traumatic experiences in the face of limited resources or support structures, restricted learning possibilities, loss of community modeling and support, and, effectively, no access to professional assistance. Violence during

pregnancy is another oft-existing experience common to both communities. However, Papua New Guinea faces additional difficulties in comparison to Australia. For example, according to recent figures cited by the World Health Organization (Global Health Workforce Alliance, 2015), total health expenditure per capita in PNG is Intl \$151 and 0.5 doctors per 10,000 Papuans compared to Australia's Intl \$4,068 and one doctor per 302 Australians.

In Papua New Guinea, the effects of intergenerational trauma are constantly visible. In the highlands, for example, Dr. Jim Radcliffe, resident surgeon at Kudjip Hospital since 1986, reports that local doctors who have been working in the area for decades have observed a shift from violence between tribes to violence within the village and family (personal communication). Case examples include a woman's Achilles being chopped, so she cannot run away, and another woman's arm being chopped off because she did not please her husband. This injury renders a woman severely disabled: with her hands she tends the garden to produce food (often in the complete absence of shops), she carries everything in her *bilum* (handmade bags) that she wears around her head, and she cares for her children (the average number of children per woman is 4.6), whom she often has to carry or lead along dangerous and unsecured paths (Australian Doctors International, n.d.). Polygamy is another huge problem, erasing trust between partners, raising jealousy between wives, and time and again leading to violence, both between partners and competing women. Women are abandoned by their husband due to his many responsibilities to different wives and their children, resulting in numerous mothers bringing up children on their own with very limited resources. Children experience violence within the womb and throughout their childhood years—not only learning from birth that this is the only way to resolve conflict but also compromising their brain development, priming their fear response, and lessening their emotional control. Rape is also common and often affects young children, especially girls. The trauma spreads like a cancer slowly and ever increasingly throughout PNG society.

A complicating factor in PNG is the isolation of people who have little opportunity to escape danger or make any other changes to their lives. There is no means of transport other than walking through dangerous and hostile environments. Access to education is limited: the literacy rate in PNG is currently 67% for males and 74.8% for females (UNICEF, 2013). Lack of resources—such as a healthy variety of foods, medical attention, and things we take for granted in the West-

ern world (such as paper and pens, not to mention books, if one is literate)—and lack of education feed into the vicious cycle of helplessness, in particular in the context of trauma. Internet access, if available, is patchy, slow and expensive, thus more often than not inaccessible. Because adult learning opportunities are few, hospitals have a crucial role in educating patients and training nurses. Access to counseling or social services is largely unheard of.

A further complicating factor is the increased use of alcohol over recent years, usually home-distilled from pineapple juice, and highly potent. Currently, mainly males use alcohol, due to the male-dominated culture that sees men control resources. Also, marijuana and betel nut are being used, probably as a way to self-medicate where no other options seem to exist. Apart from alcohol being used as a problem solver, along with other drugs, it also disables the ability of the brain to react in a different way to perceived threat. (Effects such as these were highlighted in a report to the Legislative Assembly of WA—see Education and Health Standing Committee, 2012).

Of major concern is the effect of violence on the developing brain, and the consequent long-term changes on neural wiring. Children are exposed to severe forms of physical violence in their villages and families, priming their own fear response early and detrimentally. Women exposed to trauma during pregnancy—such as by their fathers because of falling pregnant out of wedlock (sometimes due to being raped), by their partners because of so-called discipline, and by competing women because of jealousy—give birth to babies who have already suffered intrauterine exposure to the severe distress of their mothers. This might prime them either to learned helplessness with a depressive response or to heightened alertness with a tendency to anxiety and emotional incompetence (Graignic-Philippe, Dayan, Chokron, Jacquet, & Tordjman, 2014).

When presenting at hospital, stories are made up to explain the injuries, often under the threat of the partner: For example, a clean straight cut on the left side of the head crossing over the ear has been known to be explained as a dog bite. Laying charges or even trying to get the police involved for protection is pointless within the Melanesian culture, which has the police biased toward their own kin or simply unable to push for custody of a violent person. At the hospital, doctors are sometimes asked to take the offending person prisoner and deliver them to the police station, as the police themselves fear getting actively involved with another tribe. At Kudjip Hospital, medical staff

are overwhelmed with cases, dealing with 150–210 patients at the outpatient clinic alone on a daily basis. This is in addition to dealing with cases presenting at Accident and Emergency and patients on the ward (max 120 beds). There is simply no time to address the fundamental problems, and this is exacerbated by the lack of training. People seem unable to speak up. As Rossouw (2014) explains:

When safety is compromised, fear-based patterns emerge, the amygdala activates the stress response system—the hypothalamus-pituitary-adrenal (HPA axis) system—resulting in increased production of CRF, ACTH, NE, adrenalin, and cortisol. This compromises cortical blood flow as well as communication to frontal systems like the prefrontal cortex. (p. 56)

However, anecdotal evidence suggests that when training is offered for the first time, such as presenting a simplified version of learning communication skills and later on a basic CBT model, interspersed regularly with short exercises that encourage people to interact (women usually sit separately from men, and this form of interaction between each other allows them to feel safe enough to engage in the exercise), it resulted in a keenness to learn and to continue with the training. A striking instance was when after two of these training sessions, a couple and a single person started to take up personal counseling—a concept never heard of before and an intervention never encountered before.

For the doctors and medical personnel working under these circumstances, the recurring trauma of handling severe cases of abuse and injury leave their traces. There is a growing sense of helplessness in the face of the seemingly insurmountable problem of violence and the lack of conflict resolution skills. At times, competing parties of local villagers end up together in the hospital, potentially putting staff at risk. At times, when talking about the effects of witnessing the distress of victims of violence and rape, traces of the maintained stress response can be observed; and seeing a person break down when talking about their experiences is also fairly common. Lack of access to debriefing, or access to creating healthy narratives around the experiences (as well as likely inadequate preparation for such experiences in the lead up to deployment) all feed into unprocessed traumatic experiences that might hamper or shorten missionaries' ability to remain on the job in the long term.

A Neuropsychotherapeutic Approach

Gladly, at least in PNG, anti-depressant medication has not yet been readily available and thus has not been frequently prescribed. This leaves a great opportunity to address the issues of learned helplessness and violence through targeted educational programs, group therapy, and personal/couple/family therapy. Parental guidance would probably go a long way in preventing damage to the next generation. Accessibility to training programs could multiply trainers, who could then start to exert influence in their own villages and bring about the beginnings of change (Global Health Workforce Alliance, 2015). Based on the observations and experiences of the first author, there is a great openness and willingness to learn in the population.

From a neuropsychological point of view, attachment gets compromised through trauma experiences. In particular, during the first three years of age (the pre-cognitive phase), the deciding factors are the time of trauma or injury or detrimental experience, which shape future reactions, the ability to shift away, and the flexibility to generate new behavior patterns. The earlier the traumatic experience happens, the harder it is for adults later on to recover and learn new behaviors. The consistency principle of Donald Hebb (1949) states that when neuron A fires into neuron B, the probability of neuron A firing into neuron B the next time is higher than for neuron A to fire into neuron C, implying that the impact of early life experiences and the role of the environment are key indicators that shape the activation patterns in the brain. Memory systems get primed to high alertness with an overproduction of stress chemicals over sustained periods of time, which in turn compromise brain development and neurogenesis (Rossouw, 2014). The survival response, initiated from lower brain areas, initiates fight/flight responses, and constant worry for one's safety translates into constant arousal of the memory system to be ready to act for survival. Parts of the population in the Kimberley and in PNG might already be living with enlarged amygdalae due to the constant threat to personal safety. Trauma can cause up to 20% reduction of the hippocampus, which in turn leads to a slower process of recovery and compromised learning ability. In compromised environments, such as those described here, learning is inhibited and the sense of self implodes. Mental illness in various forms is the inevitable result.

Adding chemicals such as alcohol inflames this process. The analogy of driving a car might help to clarify the concept: If one hits the accelerator too fast, the car could be wrecked; there is a need to slow

down on a regular basis to maintain control. Through trauma, the GABA (slow-down) response in the brain is inhibited, leaving the person constantly on hyper-alert. The release of dopamine keeps the person trapped in patterns of self-preservation where physical violence, withdrawal and depression, anxiety patterns, incompetent parenting, and learned helplessness are the norm. In a sense, people become comfortable with their discomfort and therefore tend to fall back on self-help methods, such as using alcohol and other drugs to balance the chemical overload) as well as establishing patterns of avoidance rather than approach—for example, developing and employing problem-solving skills. However, with simple education in relaxation methods and mindfulness, calming the brain, healthy sleep patterns, and making use of mirror neurons to learn new behaviors, modeling alternative conduct could be achieved in a much healthier way. Lower areas of the brain that aid survival need to feel safe before higher regions of the brain can be accessed to learn new behavior patterns such as cognitive behavior therapy. Before this can be used as an intervention, a bottom-up approach needs to be put into place to achieve readiness for learning. Trust needs to be built before an intervention can be effective. For this trust to be built, the establishment of safety (in a cross-culturally appropriate way) can help build the bridges that are necessary for initiating changes in neural firing.

Studies (see, e.g., Kim, Song, & Kosten, 2006) show that prolonged stress compromises the hippocampus, a structure involved with memory, which renders a brain less able to learn and retain new information. This would imply, long-term, that if no interventions are made available, chances for change shrink proportionally. However, we know that a therapist's wellness has an effect on the client's un-wellness and that a sense of connection, and feeling understood and valued, helps to create a safe environment in which it is possible to allow new ideas to take hold in the mind. The sooner targeted interventions can be prepared and delivered, the better the overall health outcome will be.

Conclusion

The first author has been working in the Kimberley, which has a population of around 45% of Aboriginal people, for three years. Previously she lived and worked for four years in remote Papua New Guinea, and has recently returned, after several years' break, to work 6–8 weeks per year in a remote hospital in the Highlands. What is striking is the observation of

intergenerational trauma in both somewhat similar settings.

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