

ABSTRACT

A Mathematical Modelling of the Relationship of the Subjective Experience and Decay of Life Events with Time

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The decay of the impact of significant life events with time is modelled mathematically using the physics of wave phenomena, for a set of 26 significant life events determined from a Trinidadian adult non-clinical sample from study 1 (N =150). The list of life events determined had 46% of items in common with the Holmes and Rahe (1967) SRRS list of life events and 61.5 % in common with significant life events determined by Berntsen and Rubin (2004). The life events that were unique to this study had a clear Caribbean cultural component to them. Study 2 involved the assessment of the impact of the life events determined from study 1. For study 2 the Trinidadian sample (N = 203) comprised 52% females and 47% males with an average age of 36 years (SD=13). The study was conducted using questionnaires and Likert rating scales. Participants also completed the Beck Depression Inventory, Rotter's Locus of control and Rosenberg self-esteem measures. The experience of life events was modelled as a waveform that underwent decay or damping and was similar to radioactive decay in physics. The decay of the impact of life events I at time t for the Trinidadian sample showed an exponential decay, $I = I_0 e^{-\lambda t}$ where I is the impact factor at any time t with initial impact I_0 . λ is the decay constant specific to the life event for all but one life event (church experience). The life events were defined by half-lives $T_{1/2}$ as a measure of the significant reduction of their impact with time so as to not adversely affect psychological well-being (**PWB**) of an individual. A normalized ranking was determined using the half-life and amplitude of each life event which matched the Life Change Units of the Holmes and Rahe (1967) study with $r = .511$ for $p < 0.05$. Death of a close family member and divorce had the longest half-lives in excess of 10 years consistent with their ranking on the Holmes and Rahe (1967) and Berntsen and Rubin (2004) lists of significant life events as most impacting life events. The model proposed that the psychological well-being (**PWB**) of an individual was a summation of past experiences, positive and negative, factoring in their decay from the time of occurrence to the present —

$$PWB = \sum_{i=1}^{i=n} I_{o+} e^{-\lambda t_i} + \sum_{i=1}^{i=n} I_{o-} e^{-\lambda t_i}$$

The **PWB** was strongly correlated to depression rating and moderately with self-esteem rating, with $r = .504$ and $r = .31$ respectively for $p < 0.05$ while

the locus of control showed no correlation with **PWB**, with $r = .034$. The model further proposed that life events were fractal in nature with a power law. The fractal dimension $d = 1.9$ was determined and used to predict the decay with half-life for daily hassles and uplifts. The half-life for daily hassles and uplifts was found to be 18 days.

Keywords: Life events; Mathematical modelling; Caribbean culture; Wave decay; Psychological well-being; Fractals