1163-39-564 **Candace Marie Kent*** (cmkent@vcu.edu), 3510 Hanover Avenue, Richmond, VA 23221-2208. *A modified second-order Collatz equation as a mathematical model of bipolar disorder.*

We propose, for the sake of dialogue, that the following system of difference equations serve as a phenomenological model of bipolar disorder, a psychiatric illness characterized by cycles or recurrent episodes of severe disturbances in mood (i.e., in being happy or sad, emotions at opposite poles of the spectrum):

$$\begin{cases} x_{n+1} = (ax_n + b) \bmod m, \\ \\ z_{n+1} = \begin{cases} \dfrac{-z_n - z_{n-1}}{2}, & \text{if } z_n + z_{n-1} \text{ is even,} \\ -z_n - z_{n-1}, & \text{if } z_n + z_{n-1} \text{ is odd} \end{cases} + s\delta(x_n), \end{cases}$$

and

$$\delta(x) = \begin{cases} 0, & \text{if } x \neq d \in \{0, 1, \ldots, m-1\}, \\ \\ 1, & \text{if } x = d. \end{cases}$$

The first equation in the system is a *linear congruential sequence*; and the second equation is a modified version of one of the sixteen mostly eventually periodic *Collatz difference equations*. We observe (and conjecture) that every solution $\{z_n\}_{n=0}^{\infty}$ of the system above is also eventually periodic. Thus, a solution $\{z_n\}_{n=0}^{\infty}$ of the system is intended to represent the recurrent episodes of mood disturbance seen in an individual with bipolar disorder. (Received September 09, 2020)