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Research Paper

Thin Psychological Boundaries Moderate the Relationship Between Schizotypy and Noctcaelador

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ABSTRACT: *Previous research has linked noctcaelador, affinity for the night sky, with schizotypy and thinner psychological boundaries. The present study replicated these relationships and examined whether psychological boundaries moderate the association between noctcaelador and schizotypy. Participants were 161 undergraduate students who completed measures of noctcaelador, schizotypal traits, and psychological boundaries. Consistent with previous findings, noctcaelador was positively correlated with both schizotypy and thinner boundaries. Moderation analysis indicated that schizotypy was positively associated with noctcaelador only among individuals with relatively thin boundaries. These findings suggest that personality structure may provide an important context for understanding the relationship between affinity for the night sky and nonordinary cognitive-perceptual experiences. Implications and directions for future research are discussed.*

KEYWORDS: *Noctcaelador, Schizotypy, Psychological Boundaries, Night Sky Connection, Personality Structure*

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I. INTRODUCTION

Nonordinary sensory experiences and beliefs are relatively common among the general adult population. For instance, 37.2% of university students reported having had at least one hallucinatory-like experience [1], and, on one measure, endorsed an average of 23.4% of nonmaterial (i.e., "magical") beliefs concerning themselves and the natural world [2]. Although severe manifestations of these phenomena that are associated with distress, impairment, or loss of reality testing may warrant clinical diagnosis [3], contemporary perspectives increasingly view such cognitive-perceptual experiences as existing along a continuum [4]. At less severe to moderate levels among individuals who remain psychologically well-adjusted and functionally intact, these experiences may reflect characteristics of schizotypy [5].

1.1 Schizotypy

Previously, schizotypy was described as a subclinical form of psychosis [6,7]. However, recent descriptions conceptualize schizotypy as a personality style rather than subclinical syndrome [8]. Despite this, schizotypy is rarely concisely defined from a personality perspective. For the present study, schizotypy is defined as a disposition toward unstructured patterns of thought and behavior which manifest as unusual sensory experiences, nonmaterial causal beliefs, and interpersonal detachment [5,9].

In terms of broad-scale personality dimensions, schizotypy appears to fit mostly in the factor space of openness to experience [10,11]. However, this relationship is sometimes weak and dependent on measurement [12]. Studies have related schizotypy to more flexible cognitive patterns, reductions in cognitive inhibitory control, and enhanced ability to mentally manipulate images [13]. Perhaps relatedly, schizotypy is associated with more creativity and fluid associative thought [14], hypomanic personality traits [15], exploratory interests and behavior [16], and openness to consider unusual ideas and explanations [17]. Moreover, schizotypy is associated with tendencies to perceive patterns and meaning in randomness [18].

Schizotypy has been posited to partly occur due to brain structural irregularities and hyper-dopaminergic functioning [19]. From an evolutionary perspective, it has been suggested that schizotypal traits persist across generations because they offer some psychosocial advantages [20], perhaps creativity and

cognitive flexibility. Psychological explanations suggest that schizotypal traits may develop partially from reinforcement of tangential and divergent associations and misperception of internal mental activity as sensory experiences [21,22].

1.2 Noctcaelador

Another variable that has been related to schizotypy-related experiences is noctcaelador [23,24,25]. Originally, noctcaelador was defined as psychological attachment to the night sky, like a form of place attachment [26]. Recent work broadens this conceptualization, suggesting that noctcaelador might represent a larger night sky affinity orientation that includes elements of attachment, personal meaning, and engagement tendencies [27].

As might be expected, many individuals higher in noctcaelador have an interest in astronomy-related knowledge [28]. However, specialized knowledge of the night sky is not necessary to develop an appreciation and bond with it [29]. Noctcaelador is related to artistic and intellectual interests [30], a rational coping style [31], more effortful and resource-intensive engagement with the night sky [32,33], nature connectedness [34], less existential wellbeing [35], and appreciation of city nightscapes [36]. More night sky affinity also may facilitate positive emotional reactions to night sky imagery [37]. Levels of noctcaelador have been shown to increase following guided exposure to night sky imagery [38].

Relationships with psychophysiological variables have been mixed. Noctcaelador was related to inconsistent handedness [39] and sensation seeking [40], but not chronotype [41] or temperament [42]. As such, attempts to explain noctcaelador have mostly been using psychological models. One approach suggests that night sky affinity may be part of a larger nature connectedness domain [34]. Another model suggests that individuals with a permeable psychological structure who can become more absorbed in complex stimuli may, after impactful exposure, begin to react to the night sky as a secure object that alleviates mental discomfort [43,44]. A key element to the model is psychological structure.

1.3 Psychological Boundaries

Though described in various ways, psychological structure generally refers to the degree of organization and integration of beliefs about oneself and the environment [45,46]. Psychological structure is thought to influence one's narrative of self (i.e., identity), perceptions, experiences, and place in the world [47]. An integrative approach to understanding psychological structure is Hartmann's [48,49] concept of psychological boundaries.

Boundaries can be described as divisions between mental experiences and conceptions, such as between dreams and waking, thoughts and feelings, self and others. Psychological boundaries exist on a continuum of permeability ranging from "thick" to "thin." Individuals with thick boundaries tend to have organized minds, which is reflected in their daily lives, and have clear separation of inner experiences. For instance, having clear separation between inner fantasy and external "reality". Individuals with very thin boundaries experience more unbidden flowing and merging of mental material [50]. For instance, a blending of inner fantasy and external reality.

Thinner boundaries are related with reports of more anomalous experiences, sensory processing sensitivity [51], more frequent and bizarre dreams [52], less secure interpersonal attachment styles [53], and more openness to experience [54]. It has been suggested that thin boundaries may indicate a type of ungated, complex neural interconnectedness that develops from a mix of biological and developmental experiences [49,55].

1.4 The Current Study

Previous work has associated both noctcaelador [44,56] and schizotypy [57,58] with thinner psychological boundaries. It might be that thin boundaries facilitate both the nonnormal beliefs and experiences associated with schizotypy [51] as well as the permeable psychological structure suggested to influence noctcaelador [44]. As such, associations of schizotypy and noctcaelador may partly reflect, or be influenced, by thin boundaries. Indeed, it might be the case that very thin, relative to average or thicker boundaries, allow the crossing of nonnormal schizotypal mental material into awareness [55].

The purpose of the current study was first to replicate the relationship between noctcaelador and schizotypy-related experiences [23,24,25] and second, to examine the possible role of psychological boundaries in that relationship. Given that noctcaelador has shown little relation with social detachment [30,59], the schizotypal aspects associated with noctcaelador are likely to include the nonnormal beliefs and sensory experience aspects of schizotypy [23,25]. As such, for the present study a validated measure specifically reflecting these aspects of schizotypy was chosen. Based on previous findings, it was hypothesized that noctcaelador would be significantly positively related to both schizotypy and thinner boundaries (Hypothesis 1).

Also, it was hypothesized that the positive relationship between noctcaelador and schizotypy would be strongest among individuals with thinner psychological boundaries. (Hypothesis 2).

II. METHODS

2.1 Participants and Procedure

The sample included 161 students (102 women, 54 men, and 5 did not identify) enrolled in undergraduate psychology courses at a university in the southwestern region of United States. The average age of the sample was 20.80 years (SD = 3.25) ranging from 18 to 40. Most participants (n = 115, 71.4%) identified their race/ethnicity as Latinx, followed by White/Caucasian (n = 23; 14.3%), Black or African American (n = 10, 6.2%), Asian (n = 5, 3.1%), Native American (n = 1, 0.7%), and "Other" (n = 7, 4.3%).

Participants were recruited from undergraduate psychology courses to complete hardcopy questionnaires in group settings before regular class meetings. Written informed consent was provided before completing questionnaires. No time limits were imposed for survey completion, and no exclusionary criteria were used. The study was approved by the university ethics board where data was collected (Texas A&M University-Kingsville). Portions of this data were described in a previous study [44].

2.2 Measures

2.2.1 Noctcaelador

Noctcaelador was measured using the 4-item version of the Noctcaelador Inventory [43]. The measure is an abbreviated version of a 10-item scale [60]. A sample item is "Having time to look at the night sky is important to me." Participants respond to items using a 1 (strongly disagree) to 5 (strongly agree) scale. Responses to items are summed such that higher scores indicate more noctcaelador. Support for the validity and a 1-month test-retest reliability coefficient of .81 have been reported [43].

2.2.2 Schizotypy

Schizotypal traits were measured using the 13-item Schizotypal Personality Scale [61]. A sample item is "Do you ever feel your thoughts don't belong to you?" The scale includes items that reflect paranoid ideation, unusual perceptual experiences, and magical ideation. Participants responded to items using a 0 (no) or 1 (yes) format. Responses are summed such that higher scores indicate more schizotypy. Support for validity and a 4-year test-retest reliability coefficient of .64 have been reported [61].

2.2.3 Psychological Boundaries

Psychological boundaries were measured using the 18-item Boundaries Questionnaire-18 [62]. The measure is an abbreviated form of a longer scale [49]. A sample item is "My feelings blend into one another." Participants respond using a 0 (strongly disagree) to 4 (strongly agree) scale. Responses are summed such that higher scores indicate thinner psychological boundaries. Support for the validity and a coefficient alpha reliability coefficient of .77 have been reported [51,63]. The longer scale version demonstrated a 6-month test-retest reliability coefficient of .77 [64].

2.3 Statistical Analyses

All statistical analyses were calculated with SPSS v. 32 for Windows (IBM Corp., Armonk, N.Y., USA). Scale properties were examined with standard statistics: mean (M), standard deviation (SD), coefficient alpha reliability (α), and skewness. Pearson produce moment correlation coefficients were calculated to examine relationships between variables. Using previous criteria [65] correlation coefficients were deemed to be small, medium, or large if they exceeded .10, .30, and .50, respectively. To examine moderation effects, the PROCESS macro for SPSS (Model 1) was used [66]. Noctcaelador was entered as the outcome (y), schizotypy (x) as the predictor, and boundaries as the moderator (w). The 16th, 50th, and 84th percentiles of BQ-18 scores were used to identify low, average, and high thin boundaries, respectively. Though commonly used in PROCESS models, bootstrapping was not utilized for estimating confidence intervals as no indirect effects were examined. Findings were considered significant if 0 did not fall within the 95% confidence interval. Findings were considered statistically significant if $p < .050$ (two-tailed).

III. RESULTS

Preliminary analysis indicated that age was not significantly correlated with any variables, $rs < .11$, $ps > .155$. There were no gender differences for variables, $ts < 1.60$, $ps > .111$. As such, sociodemographics were not included as covariates. Skewness for all variables was deemed acceptable, e.g., ≤ 1.09, indicating relatively normal distributions.

Correlations among scale variables are presented in Table 1. As seen in the table, all variables were significantly correlated. Noctcaelador had a small correlation with schizotypy and a medium correlation with thin boundaries. Boundaries and schizotypy had a large positive correlation.

For the moderation analysis, Variable Inflation Factors (VIFs) were acceptable, i.e., ≤ 1.36, indicating collinearity was not an issue. Results of the PROCESS moderation analysis (Table 2) indicated that the overall model significantly predicted 20.2% of noctcaelador's variance. Although neither schizotypy nor boundaries exhibited significant independent effects, their interaction was significant. Examining the conditional effects of the interaction (Table 3) revealed that at relatively low (16th percentile) and average (50th percentile) levels of boundary thinness, schizotypy was unrelated to noctcaelador. However, at relatively high levels of boundary thinness (84th percentile), schizotypy was positively significantly associated with noctcaelador.

Table 1: **Descriptive statistics and correlations between scales**

Variable	1	2	M	SD	α
1. Noctcaelador			10.77	4.86	.888
2. Schizotypy	.27		4.55	3.06	.724
3. Boundaries	.42	.52	39.35	11.26	.803

Note: N = 161. All correlations significant at $p < .01$.

Table 2: **Boundaries as a moderator on the relationship between noctcaelador and schizotypy**

Predictor	b	SE	t	p	95% CI
Schizotypy	-0.88	0.47	1.87	.064	[-1.82, 0.05]
Boundaries	0.05	0.06	0.88	.383	[-0.07, 0.17]
Schizotypy × Boundaries	0.03	0.01	2.22	.028	[0.003, 0.047]

Note: $R^2 = .202$, $F = 13.25$, $p < .001$.

Table 3: **Conditional effects of thin boundaries on the schizotypy-noctcaelador relationship**

Predictor	b	SE	t	p	95% CI
Low Thin Boundaries	-0.18	0.19	0.96	.338	[-0.564, 0.195]
Average Thin Boundaries	0.11	0.13	0.86	.389	[-0.147, 0.375]
High Thin Boundaries	0.39	0.18	2.19	.030	[0.037, 0.738]

IV. DISCUSSION

Findings of the current study were consistent with the hypotheses: first, noctcaelador, thin boundaries, and schizotypy were all significantly intercorrelated at the bivariate level. Second, the moderation analysis suggested that schizotypal characteristics were associated with higher noctcaelador primarily among individuals with relatively thin psychological boundaries. That is, thin boundaries appear to be a condition influencing the relationship between noctcaelador and schizotypy. These findings support previous suggestions that correlations between noctcaelador and nonnormative processes may occur in the context of personality structure [24.56].

In terms of previous research, the current study replicated relationships between noctcaelador and schizotypy [23,24,25], noctcaelador and thin boundaries [56] and thin boundaries and schizotypy [55]. Further, the current study clarifies previous findings by indicating that thin boundaries may provide a context for the relationship between schizotypal characteristics and affinity for the night sky. Interestingly, a broader implication of the current results may be that the organization of one's psychological structure facilitates both nonordinary experiences and a means to stabilize and ground the self.

Specifically, on one hand, thin boundaries may make some individuals more susceptible to maladaptive psychological processes [50]. On the other hand, thinner boundaries may also allow some individuals to become absorbed in experiences and find sources of grounding oneself, such as connecting with the night sky, amid disquieting experiences associated with a permeable psychological structure. Previous authors have noted that providing organizing frameworks may facilitate harnessing nonordinary experiences and thought patterns to make them adaptive and useful [67]. Similarly, exposure to night sky imagery seems to provide a sense of calm and "healing" which may help individuals feel more buttressed and "whole" [68]. Currently the speculation that night sky engagement might calm disquieting mental experiences among individuals with thin boundaries remains theoretical and requires additional investigation [43].

While the current study clarifies previous findings and allows for speculation of broader implications, there are limitations which should be considered. For instance, the study was cross-sectional, which does not allow for causal directionality. While thin boundaries and schizotypy are related with noctcaelador there is as yet little evidence for the theoretical directionality implied by this study. Further, the utilization of a relatively small sample of mostly female Latinx university students may not generalize to the broader population. The use of self-report questionnaires, at best, provides one snapshot in time rather than lifelong patterns of experiences and may be influenced by response bias. Finally, another limitation is that while openness to experience has been associated with schizotypy [11], noctcaelador [59] and psychological boundaries [69], it was not included in the current study.

Future research is needed to replicate the current findings among larger, more diverse community samples. Longitudinal designs would provide better evidence for causal directionality. Also, using more extensive measures and experience sampling might provide better understanding of longer-term patterns. Other areas of future study might be to explore developmental aspects of boundaries and noctcaelador. For instance, it has been suggested that thinner boundaries develop because of a lack of identification with structured adults as well as a lack of adequate autonomy in early to middle childhood [49]. If this is the case, developmental outcomes of early to middle childhood such as autonomy, initiative, and industriousness might also be correlated with both boundaries and noctcaelador [70]. Future research might examine noctcaelador in relation to multidimensional self-structure measures [71] and other variables closely linked to the self-structure such as subjective emptiness and self-fragmentation [72,73]. Finally, inclusion of a measure of openness to experience as a covariate might provide more confidence with regards to associations between the target variables.

In conclusion, replicating previous findings, the current study found that noctcaelador was related to schizotypy. However, this relationship only held among individuals with thinner boundaries. Additional study is needed to extend and better understand possible implications of the findings.

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