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The Dynamic Association between Healthy Leisure and Substance Use in South African Adolescents: A State and Trait Perspective

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Abstract

South Africa has an increasing adolescent substance use problem, lack of leisure opportunities and resources, and high adolescent discretionary time. How aspects of leisure relate to adolescent substance use is not well understood. Little research has been conducted on the leisure behaviors and experiences of South African adolescents, if and how those behaviors are associated with substance use, and ecological influences on those associations. By applying multi-level models to longitudinal data obtained from youth living in high-risk contexts, this research examines the association between state and trait healthy leisure and adolescent substance use and how perceived parental over-control moderates those associations. Results indicate healthy leisure protects against substance use at state and trait levels, provides empirical support that risk behavior can be addressed through leisure-based interventions, and emphasizes the importance of both short- and long-term processes when considering the context-dependent nature of adolescents' leisure experiences.

Keywords

adolescence; health; leisure; South Africa; substance use

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South Africa (SA) is a developing nation with an increasing adolescent substance use problem (Wegner, Flisher, Muller, & Lombard, 2006), lack of recreation opportunities and resources, and high incidence of adolescent discretionary time (Wegner, 2011). In particular, South Africa's Western Cape has the highest levels of adolescent drug use in the country where over half of the 8th to 11th graders reported using alcohol, 37% using tobacco, and 16% using marijuana each month (Reddy et al., 2010). SA adolescents transition through substances at a faster rate than their United States counterparts and initiate illicit substance use at an earlier age (Patrick et al., 2009).

Little research has focused on the leisure behaviors and experiences of SA adolescents, their association with substance use, and ecological influences on these relationships. Interventions targeting health risk behavior have existed for decades but until recently did not address healthy leisure as a means of reducing risk behavior (Caldwell, Baldwin, Walls, & Smith, 2004). By providing adolescents tools to develop leisure interests, negotiate leisure constraints, and initiate leisure activities, they may engage in healthy meaningful leisure pursuits rather than risky behavior. However, little is known about how healthy leisure may relate to adolescent substance use in practical settings (Freire & Caldwell, 2013).

Our study, guided by Problem Behavior Theory, used multi-level modeling and repeated measurement occasions to understand how stable healthy leisure (i.e., trait) and context-specific healthy leisure (i.e., state) contributed to adolescent substance use and whether perceived parental over-control moderated these relationships.

Conceptual Framework

Problem Behavior Theory (PBT; Jessor & Jessor, 1977) is a social psychological framework of risk behavior focused on three related systems: personality, perceived environment, and behavior system. PBT suggests health risk behaviors co-occur as a result of an adolescent's tendency for unconventionality (Jessor & Jessor, 1977), and is a cyclical process where engagement in one risk behavior is associated with an increased tendency to engage in additional risk behaviors. PBT has been extended to health behaviors where risk behaviors are viewed as health-compromising behaviors and protective factors are seen as health-enhancing behaviors. Donovan, Jessor, and Costa (1991) posited health-enhancing behaviors are socially normative and expected. For example, a qualitative study conducted in SA suggested adolescents perceived disapproval of substance use from parents, teachers, and peers (Morojele, Brook, & Kachieng'a, 2006). Following the same perspective as Donovan and colleagues, where engagement in health-enhancing behaviors suggests a health-focused lifestyle, we viewed healthy leisure as another factor indicative of a health-focused lifestyle and a health-enhancing orientation.

The Leisure Activities-Context-Experience (LACE; Caldwell, 2011) model provides an ecological conceptualization of healthy leisure by addressing the activity, its broader context, and personal experiences that may facilitate or diminish leisure. Such factors are important to understand as they "combine to create conditions that either serve to protect the youth from negative or risky behaviors or promote positive and healthy development" (Caldwell & Faulk, 2013, p. 50). The LACE model was used to identify factors that may

serve to encourage healthy leisure behaviors and consequently positive development. Our study identified specific dimensions of adolescent healthy leisure and examined how these factors related to adolescents substance use patterns.

Little research has explicitly conceptualized healthy leisure and its association with health risk behavior. Sharp and colleagues (2011) examined the relationship of healthy leisure with past month substance use and whether changes in healthy leisure predicted changes in substance use. They found higher levels of healthy leisure at baseline were associated with lower levels of alcohol and marijuana use. As levels of healthy leisure increased over time, the likelihood of using alcohol, tobacco, and marijuana decreased.

Building on Sharp et al.'s (2011) study, we wanted to understand how the state of healthy leisure (in the moment) related to trait healthy leisure (i.e., stable personality) and if that relation was associated with substance use across time. State and trait constructs can be used to represent between-person (trait) and within-person (state) differences. Therefore, we examined healthy leisure from a state and trait perspective to capture occasion-specific fluctuations associated with substance use. Our examination used a broader dimensional conceptualization of healthy leisure than Sharp et al.'s single dimension. We included the same subjective dimension as Sharp et al. and also included a *planning for healthy leisure* dimension as suggested by the LACE model. Furthermore, our study expands Sharp et al.'s study by accounting for intensity and recency of use of five substances.

Perceived Parental Over-control

Parental monitoring may mitigate adolescent substance use (Dishion & McMahon, 1998). However, Kloep and Hendry (2007) argued that over-protection, or over-control, by adults may lead to a negative, cyclical process whereby adults expect adolescents to constructively use their leisure time. When youth fail, adults exert more influence and control over the use of leisure time. When this adult influence happens, an adolescent's personal control is threatened. This behavior is problematic because personal autonomy has been associated with enhanced well-being in adolescents (Caldwell & Witt, 2011; Kerr & Stattin, 2000). Further, since adolescence is a time of autonomy development, parental over-control may interfere with acquisition of developmental tasks and abilities such as problem solving skills and successful negotiation of stressful experiences (Fox & Calkins, 2003), which are skills associated with avoiding substance use (Shedler & Block, 1990). Adolescents who perceive their parents are too controlling may also experience less positive leisure experiences due to reductions in autonomy, initiative, and self-determination (Sharp, Caldwell, Graham, & Ridenour, 2006). Thus we wondered whether parental over-control moderated the relationship between healthy leisure and substance use.

We examined the association between healthy leisure and substance use and hypothesized: (a) at a between-person level, lower levels of trait healthy leisure would tend to be associated with higher levels of substance use; (b) at a within-person level, on occasions when a student is engaging in less healthy leisure, he or she will tend to use more substances than usual; and (c) perceived parental over-control will moderate the association at both the

state and trait level. In addition, gender, cohort, treatment, and school were included in the model as covariates.

Methods

Context, Participants, and Procedures

Data for this study came from a five-year effectiveness trial of HealthWise South Africa (HW; Caldwell, Smith et al., 2004). HW is an intervention designed to reduce substance use and risky sexual behavior by targeting positive use and experiences of free time among a sample of South African adolescents. HW was implemented in grades 8 and 9 and taught within the life orientation curriculum mandated by Cape Town's Metro South Education District. Students exposed to HW received lessons about engaging in healthy leisure pursuits as well as information and protective behaviors to reduce sexual risk and substance use. In an extensive evaluation study conducted over five years, HW demonstrated positive results in reducing risk behavior (Caldwell, Smith et al., 2004; Smith et al., 2008).

The study site was located in Mitchell's Plain, an area created by the Group Areas Act that established racially segregated geographical zones. Mitchell's Plain is approximately 22 kilometers outside Cape Town. Although the Apartheid legislation has been abolished, Mitchell's Plain remains a homogeneous setting as reflected in characteristics of the current sample. Students ($N=5799$) were predominately Coloured (i.e., mixed ancestry; 91%) with similar levels of socio-economic status as measured by running water in the home (93%), electricity in the home (97%), and type of home structure (79% resided in a brick house). In addition, students were exposed to a similar environmental context where substance use and gangsterism were evident and opportunities for recreation were limited, unsafe, or were of a poor quality.

For the effectiveness trial, 25 schools in the local area were identified to participate in the initial research. Out of the pool of 25 schools, six were excluded due to implementation concerns. Of the remaining 19 schools, four were randomly assigned to receive HW, and five were chosen as matched no-treatment control schools. This homogeneous sample was chosen to control for environmental and socio-economic factors allowing a more precise examination of how individuals' behaviors changed across time and context. Institutional Review Boards at study-affiliated universities and school administrators approved the study and its passive parental consent and adolescent assent procedures.

Students were followed longitudinally in three cohorts starting in 8th grade. Cohort 1 began in March 2004 and was followed from 8th to 11th grade resulting in eight bi-annual measurement occasions. Cohort 2 began a year later in March 2005 and was followed from 8th to 10th grade (6 measurement occasions). Finally, Cohort 3 began the subsequent year in March 2006 from 8th grade to the middle of 10th grade resulting in five measurement occasions. Students completed surveys using personal digital assistants at the beginning and end of each academic year during school hours. The survey was available in English and Afrikaans and took approximately 30 minutes to complete.

Our analyses included both treatment and control students who indicated substance use at any wave and provided at least four waves of data resulting in a sample of 3,383 students retained for analyses. The reduced sample was 13.8 years old ($SD=0.73$, range 12–18 years old) on average at Wave 1, 53% female ($n=1803$), and 63% ($n=2148$) in the control group.

Measures

Measures used in the study included substance use, healthy leisure, and perceived parental over-control while controlling for known covariates. Students reported on each of these variables on up to seven measurement occasions allowing us to understand fluctuations across time.

Students were asked to report on both recency and frequency of substance use for alcoholic drinks, tobacco, methamphetamines, marijuana, and inhalants; answers were coded on a 4-point scale. For example, alcoholic drinks were indexed as 1=Lifetime use, 2=Lifetime use and one or fewer drinks in the past month, 3=Lifetime use and two to three drinks in the past month, and 4=Lifetime use and four or more drinks in the past month. A composite substance use score was calculated as the sum across five substance types. Students indicating no lifetime use on all measurement occasions were excluded from analyses.

Anticipating two factors for healthy leisure, we conducted exploratory factor analysis (EFA) with promax rotation using 15 survey items that represented aspects of healthy leisure (e.g., initiative, planning, restructuring). Two distinct factors of healthy leisure and leisure planning efficacy emerged (see Table 1). Factor 1, healthy leisure, included items representing subjective perceptions of healthy leisure. Factor 2, leisure planning efficacy, included items referencing the ability to plan free time activities. Each factor was averaged to obtain scale-level scores (i.e., extent of agreement with each statement indicated using a 0 = strongly disagree to 4 = strongly agree scale).

Additional variables included as moderators or covariates of the association between healthy leisure factors and substance use were perceived parental over-control (PPOC; see Table 1), treatment, gender, cohort, and school. PPOC was conceptualized as a scale from three survey items targeting parental influence in free time use. Both treatment and gender were dummy coded such that a value of zero referred to control students and males respectively and was centred.

Analysis Plan

Generalized linear multilevel models (Snijders & Bosker, 1999) were used to examine associations between state and trait healthy leisure and substance use while accommodating the nested nature of the data (repeated measures nested within students) and the count nature of the substance use composite. Models were estimated using PROC GLIMMIX in SAS 9.3.

The intra-class correlation coefficients of healthy leisure factors produced high degrees of within-person variability (healthy leisure, 64%; leisure planning, 63%; PPOC 62%) that facilitated examination of both within- and between-person associations. Bi-annual healthy leisure factors were person-centered and separated into person- and occasion-specific components (Bolger, Davis, & Rafaeli, 2003). $TraitHealthyFac_i$ was calculated as the

within-person mean of a student's healthy leisure factor scores. $StateHealthyFac_{ij}$ was then calculated for each measurement occasion as the occasion-specific deviation from the individual mean. Scores were used in a multi-level Poisson regression to examine if and how student's substance use was associated with healthy leisure, and if these couplings were moderated by perceived parental over-control. The model controlled for gender, treatment, school, and cohort and was specified as:

$$\log(SubUse_{ti}) = \beta_{0i} + \beta_{1i}(wave_{ti}) + \beta_{2i}(wave^2_{ti}) + \beta_{3i}(StateHealthyLeisure_{ti}) + \beta_{4i}(StateLeisurePlanningEfficacy_{ti}) + \beta_{5i}(Ind_PPOC_{ti}) \quad (1)$$

where student i 's substance use composite score at time t ($SubUse_{ti}$) was modeled as a function of person-specific: (β_{0i}), state healthy leisure and leisure planning efficacy factor (β_{3i} , β_{4i}), and perceived parental over-control (β_{5i}), while controlling for the quadratic shaped trajectory of substance use over time (β_{1i} , β_{2i}). Simultaneously, these parameters were modeled as:

$$\beta_{ki} = \gamma_{k0} + \gamma_{k1}(\text{TraitHealthyLeisure}_i) + \gamma_{k2}(\text{TraitLeisurePlanningEfficacy}_i) + \gamma_{k3}(\text{PPOC}_i) + \gamma_{k4}(\text{Gender}_i) + \gamma_{k5}(\text{Treatment}_i) + \gamma_{k6}(\text{School}) + \gamma_{k7}(\text{Cohort}) + u_{ki} \quad (2)$$

where each person-specific parameter is a function of the sample average (γ_{k0}), individuals' trait healthy leisure scores (γ_{k1} , γ_{k2}), perceived parental over-control (γ_{k3}), gender (γ_{k4}), exposure to the HW intervention (γ_{k5}), and school (γ_{k6}) and cohort (γ_{k7}) controls. Person-level predictors were centered at sample means to facilitate interpretation.

Results

In a preliminary step we identified the most appropriate model for the sample's developmental course of substance use. We tested the relative fit of linear, quadratic, and cubic models of growth and found a quadratic function best represented the data. Overall, sample-level change was described by a linear increase $\gamma_{01} = 0.279$, $p < .0001$ with a slight negative curvature $\gamma_{02} = -0.041$, $p < .0001$ (keeping in mind the log scale). Interactions with gender indicated that females tended to have both lower initial levels ($\gamma_{04} = -0.22$, $p < .001$) and shallower increases ($\gamma_{14} = -0.10$, $p < .001$; $\gamma_{24} = -0.01$, $p < .001$) of substance use. Development and covariate were carried into the full model.

State and Trait Results

Table 2 presents results from the full model. On average, when trait healthy leisure was low, students tended to use more substances ($\gamma_{01} = -0.201$). There were no significant results for the leisure planning efficacy factor at the state or trait level. Hypothesis 1 was supported for the healthy leisure factor but not for the leisure planning efficacy factor. On occasions when state healthy leisure was lower than usual, students also tended to use more substances ($\gamma_{30} = -0.068$). Hypothesis 2 was supported for the healthy leisure factor but not for the leisure planning efficacy factor. Trait healthy leisure moderated the relationship between state healthy leisure and substance use ($\gamma_{31} = -0.057$). Johnson-Neyman interaction probing (Preacher, Curran, & Bauer, 2006) indicated a significant healthy leisure state by trait

interaction for trait values over -0.57 . Students with low trait healthy leisure demonstrated shallower trajectories of substance use.

Perceived Parental Over-control and Covariates

PPOC was associated with substance use at both the within- and between-person level. Higher trait levels of PPOC were associated with greater student substance use ($\gamma_{03}=0.106$) and on measurement occasions when students were higher than their average on PPOC, they also tended to use more substances ($\gamma_{50}=0.063$). PPOC significantly predicted substance use independent of healthy leisure or leisure planning efficacy at either the state or trait level.

There were no significant main or interaction effects for treatment and it did not moderate the relationship between healthy leisure factors and substance use. A third level of nesting was not needed given the lack of evidence of differences between schools or cohorts. Gender was included in the model as a covariate.

Discussion

Results identified associations between substance use and both trait and state healthy leisure. Higher levels of trait healthy leisure were associated with a tendency to use fewer substances. On occasions when students experienced higher than normal levels of healthy leisure, they tended to use fewer substances. However, there was no significant association for leisure planning efficacy at either the trait or state level. Perceptions of parental over-control did not moderate the relationship.

Healthy Leisure and Substance Use

Multiple facets of the SA context may influence the relationship between substance use and trait and state healthy leisure. Motivations for SA adolescent substance use include using substances to avoid negative social interactions such as peer rejection (Patrick et al., 2009). Additionally, religion could play a role in state healthy leisure since Muslim individuals may attend religious services or fast on holy days, limiting their ability to engage in physical activity (Palen et al., 2010).

Related factors such as serving as head of the household, community safety (Daniels & Adams, 2010), school drop-out, unemployment, and poverty may influence trait healthy leisure. For example, child-headed (i.e., under 18 years old) households have emerged as an increasing issue within SA (Meintjes, Hall, Marera, & Boulle, 2010). If adolescents spend time caring for younger siblings, they may have no time left to engage in healthy leisure activities and no role model to demonstrate healthy leisure lifestyles.

Serious concerns with community safety existed in the study area. The gang activity and violence prevalent in the Western Cape make safely engaging in healthy leisure activities difficult and likely restricts leisure pursuits to the home. Schools generally have barbed wire around the schoolyard to keep gangsters out. One adolescent female stated “if you stand alone against those gangsters, then it’s like they gonna overpower you... If the community is too scared to stand up to them, one person can’t just do it alone” (Palen et al., 2010, p. 447).

Perhaps the most powerful contextual factor that may mitigate participation in healthy leisure is the lack of structured recreational opportunities and access to facilities (Silbereisen, 2003). Wegner (2011) conducted a photoelicitation study with SA adolescents and participant photos illustrated parking lots used as sports areas due to sports fields being secured with gates and barbed wire to deter illegal activity. The lack of community facilities created an environment with “few options for exposure to, and participation in, leisure activities” (p. 21). SA adolescents frequently reported a lack of facilities, equipment, and/or resources as a main leisure constraint (Palen et al., 2010). In addition, it is uncommon for individual schools to have recreational facilities and equipment to provide healthy leisure opportunities.

Perceptions of Parental Over-control

Substance use was higher when average levels of PPOC were high and on occasions when individuals reported higher than their average levels of PPOC. Our results supported that parental over-control is associated with negative adolescent outcomes (Kerr & Stattin, 2000). As an example, naming parents as the most common interpersonal constraint to leisure, SA adolescents reporting disobeying parental limits and rules due to this control (Palen et al., 2010). Unexpectedly, PPOC did not moderate the relationship between healthy leisure and substance use. Perhaps the monitoring of adolescent activity is often conducted by others within the extended family, or neighboring homes in this context (Amoateng, Barber, & Erickson, 2006). Our study did not capture extended family or other social structures that may have provided monitoring.

Limitations and Future Directions

In interpreting results and implications, potential limitations should be considered. First, data were collected from adolescent using self-report measures, which are prone to social desirability bias and may result in under- or over-estimated reports of substance use and healthy leisure. Second, we included individuals who provided data on four or more measurement occasions. Those who dropped out of the study may have used substances at a higher rate than those who stayed in, which may have resulted in a conservative estimate of healthy leisure’s influence on substance use. Further, although the composite substance use measure accounts for all substances and their intensity of use, the item configurations did not allow for differentiation between consistent low or moderate poly-substance use, and infrequent intense use of one substance.

Given the lack of prior research on healthy leisure, we are still considering how adolescents conceptualize healthy leisure. Future work should continue to develop precise definitions and validate measures that capture the nuances and context-specificity of those definitions. Although theoretically robust, the efficacy for planning healthy leisure did not emerge as a covariate with substance use, which was puzzling and worth exploring in future studies.

Finally, state and trait healthy leisure was assessed through bi-annual measurement occasions that may not accurately reflect the speed and frequency with which adolescents’ healthy leisure and substance use changes. However, results clearly indicated systematic changes in and associations between healthy leisure and substance use occurring at this time

scale. More frequent measurement may uncover how these behaviors are coupled on a weekly or daily basis.

In conclusion results support an association between substance use and healthy leisure at both a state and trait level and further illustrate the need for adolescents to have access to recreation opportunities and facilities. Information gained from the current study serves (a) to better understand South African adolescent risk behavior, (b) as a starting point for conceptualizing healthy leisure, and (c) to identify how healthy leisure relates to adolescent substance use.

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Table 1

Scale Reliability and Factor Analysis

Factor	Variable	M	SD	Factor Loadings	Eigenvalue	% of Variance
Healthy Leisure ($\alpha=0.77$)	I get a lot of benefits (good things) out of my free time.	2.60	1.18	.67	.27	
	The things that I do in my free time are healthy.	2.70	1.15	.64	.25	
	I feel good about myself in my free time	2.96	1.03	.58	.24	36.9
	Having health free time activities can help me avoid risky behavior.	2.76	1.19	.55	.25	
Leisure Planning Efficacy ($\alpha=0.76$)	I am confident I can plan activities for myself without help from my parents.	2.57	1.20	.26	.66	
	I know how to plan my free time activities.	2.81	1.08	.28	.66	
	I make good decisions about what to do in my free time.	2.86	1.06	.28	.58	6.4
	I know how to get the information needed to make the best choice of what to do in my free time.	2.73	1.08	.19	.50	
Perception of Parental Over-Control ($\alpha=0.73$)	My parents have too much control over what I do in my free time.	1.97	1.31			
	I think my parents interfere too much in my free time.	1.92	1.33			
	There are things I would like to do in my free time but I am not allowed to do them.	2.03	1.32			

Note: N=5638 students, M=Mean, SD=Standard Deviation. Item response ranged from 0 (strongly disagree) to 4 (strongly agree).

Table 2

Multi-Level Model for Healthy Leisure Factors as a Function of Substance Use

Parameters	Estimate (Standard Error)
Fixed Effects	
Intercept, γ_{00}	1.154* (0.072)
Trait Healthy Leisure, γ_{01}	-0.201* (0.077)
Trait Leisure Planning Efficacy, γ_{02}	0.096 (0.079)
Average PPOC, γ_{03}	0.106* (0.039)
Wave, γ_{10}	-0.095* (0.013)
Wave*Trait Healthy Leisure, γ_{11}	0.047 (0.032)
Wave*Trait Leisure Planning Efficacy, γ_{12}	-0.051 (0.033)
Wave*Average PPOC, γ_{13}	-0.030 (0.016)
Wave*Gender, γ_{14}	-0.102* (0.024)
Wave*Treatment, γ_{15}	0.007 (0.025)
Wave ² , γ_{20}	-0.044* (0.001)
Wave ² *Trait Healthy Leisure, γ_{21}	0.000 (0.004)
Wave ² *Trait Leisure Planning Efficacy, γ_{22}	-0.008* (0.004)
Wave ² *Average PPOC, γ_{23}	-0.002 (0.002)
Wave ² *Gender, γ_{24}	-0.012* (0.003)
Wave ² *Treatment, γ_{25}	0.003 (0.003)
State Healthy Leisure, γ_{30}	-0.068* (0.014)
State*Trait Healthy Leisure, γ_{31}	-0.057* (0.027)
State*Trait Leisure Planning Efficacy, γ_{32}	-0.006 (0.027)
State*Average PPOC, γ_{33}	0.022 (0.014)
State*Gender, γ_{34}	-0.013 (0.022)
State*Treatment, γ_{35}	0.005 (0.022)
State Leisure Planning Efficacy, γ_{40}	-0.017 (0.014)
State*Trait Healthy Leisure, γ_{41}	0.018 (0.030)
State*Trait Leisure Planning Efficacy, γ_{42}	-0.044 (0.027)
State*Average PPOC, γ_{43}	-0.029 (0.015)
State*Gender, γ_{44}	0.020 (0.022)
State*Treatment, γ_{45}	0.011 (0.022)
Individual PPOC, γ_{50}	0.063* (0.009)
Monitoring*Trait Healthy Leisure, γ_{51}	0.023 (0.019)
Monitoring*Trait Leisure Planning Efficacy, γ_{52}	-0.018 (0.019)
Monitoring*Average PPOC, γ_{53}	0.006 (0.011)
Monitoring*Gender, γ_{54}	0.008 (0.015)
Monitoring*Treatment, γ_{55}	-0.012 (0.015)

Parameters	Estimate (Standard Error)
Gender, γ_4	0.221* (0.058)
Treatment, γ_5	-0.021 (0.081)
School, γ_6	0.002 (0.013)
Cohort, γ_7	0.037 (0.021)
Random Effects	
Intercept Variance	1.009* (0.047)
Wave	0.042* (0.002)
State Healthy Leisure	0.047* (0.008)
State Leisure Planning Efficacy	0.052* (0.008)
Individual PPOC	0.019* (0.004)
$-2LL$	80220.46
AIC	80326.46

Note: Table includes unstandardized estimates and standard errors (in parentheses). Model based on up to 8 occasions nested within 3,383 students for a total of 19,564 observations used. AIC = Akaike Information Criterion; $-2LL$ = -2 Log Likelihood, relative model fit statistics.

* $p < .05$