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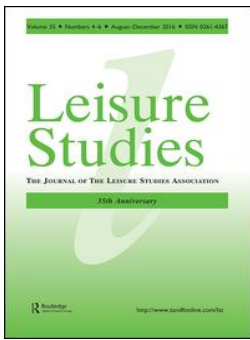
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Dimensions of self-selected leisure activities, trait coping and their relationships with sleep quality and depressive symptoms

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ABSTRACT

Although leisure is presumed to be beneficial, certain profiles of leisure may be especially good. This paper tests whether dimensions of self-selected leisure activities (SSLAs) differentially relate to depressive symptoms and poor sleep quality, including (a) positivity (SSLA-PO), (b) difficulty (SSLA-DF), (c) distraction (SSLA-DI) and (d) thinking about negative events (SSLA-TN). Furthermore, it tests whether those low in perseverative cognitions (PCs) and high in 'John Henryism' active coping are equally likely to benefit from leisure. Participants ($n = 362$, 76% female) at a large university in Wisconsin rated two SSLAs on the dimensions above and completed measures of depression, sleep quality, PCs and active coping. Regression analyses showed that SSLA-TN predicted greater depression and poor sleep quality. For the moderators, more SSLA-DI and SSLA-TN each predicted greater depression for those more prone to PCs, and more SSLA-DI predicted more depression and worse sleep quality at lower active coping levels. Results suggest that not all leisure is equally beneficial, and have implications for the design of leisure-based interventions.

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Leisure time; stress management; depression; sleep quality; perseverative cognition; John Henryism active coping

Life can be stressful, impacting sleep quality and depressive symptoms (Brosschot, Verkuil, & Thayer, 2010; Zawadzki, Graham, & Gerin, 2013a). Coping activities have been shown to improve sleep and depressive symptoms (Grossman, Niemann, Schmidt, & Walach, 2004; Irwin, Cole, & Nicassio, 2006). Coping often occurs as leisure, which typically involve intrinsically enjoyable and self-enhancing recreational pursuits (Iso-Ahola & Mannell, 2004). Indeed, leisure activities generally have shown mental and physical health benefits (Caldwell, 2005; Carruthers & Hood, 2007; Choe, Chick, & O'Regan, 2015; Hutchinson & Nimrod, 2012; Iso-Ahola & Mannell, 2004; Iwasaki, 2003; Pressman et al., 2009; Sharp et al., 2011; Siddiquee, Sixsmith, Lawthom, & Haworth, 2016; Trenberth & Dewe, 2005; Zawadzki, Smyth, & Costigan, 2015). Although the health benefits of leisure seem apparent, we examine whether there are ways of *doing* leisure that are more beneficial than others. That is, this paper tests if leisure activities differ on critical dimensions and if those dimensions differentially relate to self-reported health.

Defining self-selected leisure activities

Although leisure is an integral part of human life that contributes to physical and mental health, there is no universally accepted way of defining leisure (Iwasaki, 2003; Kleiber, Walker, & Mannell, 2011).

For instance, some view leisure as participation in specific types of recreational or cultural activities like arts, hobbies and sports (Havitz, Kaczynski, & Mannell, 2013), or as the location in which the activity occurs (e.g. recreational facilities or home setting; Iso-Ahola & Mannell, 2004), or as the amount of free time spent away from obligations like paid work or caregiving (Siddiquee et al., 2016; Trenberth & Dewe, 2005). We suggest that the activity or location of the activity is less essential than if the activity is perceived as relaxing and able to mentally take oneself away from the stress of life (Iso-Ahola & Mannell, 2004).

When discussing leisure then, we offer the term self-selected leisure activities (SSLAs) to denote that the activity is freely chosen with the express purpose of relaxation and/or mental escape. That is, the same activity may qualify as an SSLA for one person but not another. For instance, a person who paints to escape mentally is more likely performing an SSLA compared to someone who paints as their profession; likewise, biking after work to relax may better qualify as an SSLA versus when that biking is done to commute to work. This is not to say that painting for work or biking to commute cannot be leisure, but in both instances choice over the activity (e.g. when it is done) is limited. Ultimately, we argue that there are numerous ways to perform leisure and it is these dimensions that matter. More generally, SSLAs are ubiquitous in modern society, rooted in the human needs for reinvigoration and diversion and self-selected (vs. assigned) to maintain a normal daily rhythm mentally and physically (Iwasaki, 2003). What people do for leisure in their free time likely tells us more about them as individuals (e.g. intrinsic desires and beliefs) than what they do in any other context (Kleiber et al., 2011). Self-selection of the activity is key for sense of control (Iso-Ahola & Mannell, 2004), enjoyment and sustainability.

Dimensions of leisure

Although the health benefits of leisure seem apparent, no leisure activity is one-sized-fits-all and so not all leisure will be equally beneficial (Kleiber et al., 2011). This question is vital, as some work (mostly qualitative) has found mixed results with engaging in leisure (Iwasaki, 2003). The benefits of leisure may differ because people do the activity in different ways. For example, two people may read a book as their leisure, but one person does it in an environment without distractions and thus becomes engrossed in the novel, whereas another person may have the television in the background or other influences on her/his attention. In other words, leisure may have different dimensions, which in turn differentially relate to health.

Recent research highlights general dimensions of leisure coping such as a self-determination disposition, empowerment, positive impact, companionship, boredom and palliative coping (Carruthers & Hood, 2007; Iso-Ahola & Mannell, 2004; Iwasaki & Mannell, 2004; Sharp et al., 2011). Other work suggests that absorbing or engrossing oneself in the SSLA (but not relaxing) as an important moderator to the health effects of leisure (Zawadzki, Smyth, Merritt, & Gerin, 2013b). In this paper, we test additional dimensions to this work, measuring positivity of the SSLA, its difficulty to perform and its ability to distract and/or help a person to avoid negative thoughts. Below we discuss why these dimensions may be important.

Positivity

When people engage in positive tasks (i.e. rewarding), it seems plausible that these tasks would lead to more positive mood (Folkman & Moskowitz, 2004) and better sleep quality (Sonnentag, Binnewies, & Mojza, 2008). For instance, the hedonic treadmill (Diener, Lucas, & Scollon, 2006) emphasises that specific experiences momentarily influence happiness, and that repeated positive events can continue to promote more positive mood states. Recent leisure research suggests that intrinsic motivation in one's leisure predicts more happiness (Carruthers & Hood, 2007; Iso-Ahola & Mannell, 2004).

Difficulty

People might avoid difficult or challenging SSLAs as they may undermine self-confidence and sense of control (Havitz et al., 2013; Iso-Ahola & Mannell, 2004; Iwasaki & Mannell, 2004). Furthermore, a major barrier with interventions is adherence, with difficulty of related activities as a prime culprit for poor retention rates and by extension less long-term benefits (Bosworth, Powers, & Oddone, 2010). In turn, according to self-determination theory, one's self-efficacy in an activity is critical to develop and maintain intrinsic motivation to engage in an activity and thus promote several positive health outcomes (Deci & Ryan, 2008). For instance, Trenberth and Dewe (2005) find that passive-recuperative (vs. active-challenge) dimensions are more important for leisure coping with work-related stress. Yet flow theory (i.e. the ideal context for subjective experience happens when the person is mainly driven by intrinsic motivation) suggests that the balance of challenge and skill has a positive and unique role in the quality of experience with daily activities (Abuhamdeh & Csikszentmihalyi, 2012). Consequently, SSLAs that are excessively difficult may reduce self-efficacy and thus undermine good health.

Avoiding negative thoughts

Ruminative and anxiety-producing thought patterns over time are associated with increased levels of depression and poor sleep quality (Irwin et al., 2006; Zawadzki, Graham et al., 2013a). Thus, people who do SSLAs that distract them from their negative thoughts would likely have better health outcomes, such has been found among cancer patients (Folkman & Moskowitz, 2004; Kennedy & Lloyd-Williams, 2009). Likewise, people who engaged in SSLAs that were absorbing had lower daytime and night-time 24-h blood pressure levels (Zawadzki, Smyth et al., 2013b).

SSLAs and self-reported health: depression and poor sleep quality

We look at the link of dimensions of SSLAs with two aspects of self-reported health. The first is depressive symptoms (Van Dam & Earleywine, 2011). Not only is engagement in leisure activities effective in reducing depressive symptoms, but the more frequent the engagement, the greater the reduction in depressive symptoms (Fernández-Fernández, Márquez-González, Losada-Baltar, & Romero-Moreno, 2014; Pressman et al., 2009).

Second we explore poor sleep quality (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Many nonpharmacological interventions have shown positive benefits for sleep quality (Irwin et al., 2006), partly by directing attention away from one's negative thoughts and distressed moods (Grossman et al., 2004). For instance, Sonnentag et al. (2008) showed that evening engagement in self-selected 'mastery' activities like a hobby or learning new, enjoyable things enhanced pre-sleep relaxation, sleep quality and positive morning affect.

Psychosocial moderators of SSLA effectiveness

Although SSLAs have shown positive effects, it is possible that some people are likely to benefit more from leisure than others (Kleiber et al., 2011). That is, given our dimensional approach to understanding leisure's effects, some people might differentially respond to these dimensions. Hence, we focus on two potential moderators of the associations between SSLA dimensions and health that vary on their adaptiveness as emotion regulation strategies: perseverative cognitions (Brosschot et al., 2010) and John Henryism active coping (hereafter also referred to as active coping; James, 1994).

Perseverative cognitions (PCs).

PCs are defined as chronic tendencies to worry and ruminate about future and past negative events (Brosschot et al., 2010). Although certain dimensions of SSLAs may be beneficial for depressive

symptoms and sleep quality, our recent findings suggest that certain personality features may moderate their efficacy. Those with high PC tend to have a greater concurrence of negative personal self-attributes vs. their low PC counterparts, including depressive symptoms (Fernández-Fernández et al., 2014) and more intrusive, negative thoughts about stressors in their lives (Brosschot et al., 2010; Zoccola, Dickerson, & Lam, 2009). As perseveration limits the ability to distract oneself, it is hence likely that optimal engagement in SSLAs is harder for high PC persons.

Active coping

Active coping entails high striving with daily psychosocial demands (James, 1994). ‘John Henryism’ active coping emphasises how striving through daily stress with poor chances for successful outcomes can lead to excess cognitive and emotional activation, and in turn augments risk for medical disorders like depression (Merritt & Dillon, 2012). In contrast, with more resources, active coping shields one from these risks, likely helping us get the most positive leisure outcomes. Thus, among those with a high active coping style, positive and distracting SSLAs are a resource and should allow more long-term benefit whereas high difficulty presumes a lack of resources and may result in poor health.

The present study

The goals of this study were to test whether people differ on how positive, difficult to do and distracting their SSLAs are, and whether these dimensions differentially predict depressive symptoms and sleep quality. Also, we tested if those prone to engaging in PCs and active coping behave differently on SSLA dimensions and health. We predicted that stronger SSLA profiles (i.e. more positive mental state, less difficulty, more distraction) would be associated with less depressive symptomology and higher subjective sleep quality (H1), especially at lower levels of PC (H2a) and higher levels of a trait active coping profile (H2b).

Method

Participants

For extra credit points in psychology courses, college students ($n = 362$) participated in the study. They were mostly female (76.0%), about 80% from working to middle-class families, with a mean age of 21.0 ($SD = 2.96$). Most self-identified as non-Hispanic Caucasian (74.9%), African-American (8.3%), Asian-American (6.6%) or Hispanic-American (6.1%). The tactic of offering students one extra credit hour to complete the survey is an accepted standard in current American Psychological Association (2002) ethical principles of human research; as it is a nominal incentive that historically has not had undue or coercive effects on participation in survey research.

Materials and Procedure

SSLA assessment

After providing informed consent through online waiver, participants filled out all materials online, including providing demographic data. Participants described the main activity that they engaged in to relax and/or take themselves mentally away from stressful aspect of their life. After responding about the first activity, participants were asked to recall a second activity (of which 95.6% did). For each activity, using a 0 (not at all) to 6 (an extreme amount) scale, participants rated the following 11 items about each activity: how [distracting; relaxing; challenging; difficult; entertaining; rewarding; rejuvenating] the activity was; while doing the activity how much they [focused only on that activity; thought about negative events; became so absorbed in the activity that they did not notice anything else going on around them]; and the degree to which hectic aspects of life became less relevant while

doing the activity. An example item is ‘When you do the activity, how much are you focused on only it?’ As have been done previously (Zawadzki, Smyth et al., 2013b), scores for each of the 11 SSLA items across both activities were averaged to provide more stable estimates of each item and to be inclusive in the activities that participants considered and described. We also explored relationships for the SSLA characteristics separately for each specific SSLA; a similar pattern of results emerged further justifying combining across the two SSLAs.

Perseverative cognitions (PCs)

We measured perseverative cognitions using two scales. First, participants completed the 16-item Penn State Worry Scale (PSWS; Molina & Borkovec, 1994) which assesses persistent concerns with everyday challenges (e.g. ‘When I am under pressure I worry a lot.’). The PSWS has 16 items scored on a 1 (not at all typical) to 5 (very typical). Items were summed such that higher values indicated more trait worry (Cronbach’s $\alpha = .93$). Second, participants completed the 22-item Ruminative Response Scale (RRS, Nolen-Hoeksema & Morrow, 1991) which assesses ruminative coping responses to negative mood (e.g. ‘When you feel down, sad, or depressed, how much do you ... think about all your shortcomings, failings, faults, mistakes.’). The RRS has 22 items scored on a 1 (*almost never*) to 4 (almost always). Items were summed such that higher values indicated more ruminative leanings (Cronbach’s $\alpha = .95$). Because the two scales were highly correlated, $r(362) = .56, p < .001$, we standardised each scale and averaged them together to create a more reliable PCs index in which higher scores indicate higher PCs.

Active coping

The John Henryism Scale of Active Coping (JHAC; James, 1994) is a 12-item scale that assesses high-effort coping with chronic stress (e.g. ‘In the past, even when things got *really* tough, I never lost sight of my goals.’). The JHAC has 12 items scored on a 1 (completely true) to 5 (completely false) scale. Reverse-coded items were summed to derive a total JHAC score that can range from 12 to 60 points (Cronbach’s $\alpha = .84$; higher values indicated more active coping).

Self-reported health

As indicators of health, we measured depressive symptoms and sleep quality. For depressive symptoms, the validated Centre for the Epidemiological Studies of Depression (CES-D) scale (Van Dam & Earleywine, 2011) has 20 items scored on a 0 (rarely or none of the time) to 3 (most or all of the time) scale (e.g. ‘I felt lonely.’). Depressive symptoms were calculated as the sum of all 20 items (Cronbach’s $\alpha = .90$) (CES-D scores can range from 0 to 60).

For sleep quality, participants completed the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989), with 22 items assessing the following validated dimensions of sleep quality and sleep disorders in at-risk persons (Moloney, Konrad, & Zimmer, 2011): duration, disturbance, latency, day dysfunction due to sleepiness, subjective sleep quality, medication usage and efficiency. Each dimension is then re-scored on a 0–3 scale per standardised scoring instructions. Finally, a total sleep quality score is derived by summing these dimensions, ranging from 0 to 21, with higher scores indicating worse sleep quality.

Analytic Plan

First, we entered the 11 SSLA subjective ratings into an exploratory factor analysis to determine if there were higher order dimensions to the subjective SSLA characteristics. Next, for Hypothesis 1, multivariate regression models (MRMs) were run with each dimension predicting depressive symptoms and poor sleep quality. We included sex, age, higher parent education, race/ethnicity and body mass index (BMI) as covariates in the models (Moloney et al., 2011). We examined each of the SSLA dimensions in separate models, and then explored them all in the same model to test whether any

of the dimensions have independent links with depressive symptoms and sleep quality. To interpret these effects, we analysed the R^2 value and Cohen's f^2 effect size index where scores of .15 suggest a medium effect and .35 a strong effect.

For hypothesis 2, we re-ran these analyses, but now also examined the interaction effects of PCs and active coping, singly, with each of the SSLA dimensions. We examined PCs and active coping in separate models, again testing each SSLA dimension separately. For interpretation, when interaction effects were significant, we did tertile splits for the relevant trait measure and then tested the slope of each tertile as a function of the related SSLA dimension.

Results

Preliminary analyses

We entered the 11 SSLA subjective ratings into an exploratory factor analysis to assess if there were higher order dimensions to the subjective SSLA ratings. We used a principle-axis factor extraction with a varimax rotation to facilitate detection of orthogonal dimensions (determined by scree plot and eigenvalue greater than 1); we further specified a priori that items must have a minimum loading of .5 for each dimension with no cross-loading $\geq .3$. As shown in Table 1 below, three dimensions emerged that explained 61% of the variance: (a) a positive mental state while doing the activity dimension (SSLA-PO); (b) a difficulty doing the activity dimension (SSLA-DF); and (c) a distracting dimension (SSLA-DI). Three items did not load cleanly on either of these factors. Entertaining and relaxing loaded highly on multiple dimensions and thus we excluded these items from analyses. Think about negative event (SSLA-TN) did not load strongly on any dimension, despite our initial thinking that it would load on the distracting dimension. We retained it for analyses as it represented a central theoretical element, as this type of focus on negative thoughts has been shown to relate to depression and sleep quality (e.g. Zawadzki, Graham et al., 2013a). Thus, we tested two dimensions, SSLA-DI and SSLA-TN as single item predictors and moderators while for SSLA-PO (Cronbach's $\alpha = .81$) and SSLA-DF (Cronbach's $\alpha = .91$) we created composites by averaging the items for each dimension.

Also, we explored bivariate correlations between the SSLA dimensions, the health indicators, and PCs and active coping. As shown in Table 2, the correlations between SSLA dimensions ranged from $-.08$ to $.30$ suggesting the relative independence of each dimension. More positive thoughts while doing SSLAs (SSLA-PO) were correlated with more active coping. Difficulty doing the SSLA (SSLA-DF) scores was unrelated to the outcomes of interest. Being more distracted while doing SSLAs (SSLA-DI) was correlated with more perseverative thinking (PCs). Finally, more thinking about negative events while doing SSLAs (SSLA-TN) was linked with worse sleep quality (PSQI), more depression (CESD), more PCs and less active coping.

Hypothesis 1: Do SSLA dimensions predict depression and sleep quality?

Table 1. Factor loadings for the 11 subjective rating items from the Self-Selected Leisure Activities (SSLA) Scale.

	Positive mental state (SSLA-PO)	Difficulty (SSLA-DF)	Distracting (SSLA-DI)
Relaxing	.66	-.48	.06
Entertaining	.61	-.21	.43
Rewarding	.74	.22	-.23
Focused only	.70	.23	.04
Hectic aspects less relevant	.69	.05	.07
Rejuvenated	.78	.05	-.26
Absorbed	.68	.15	.07
Challenging	.22	.89	.12
Difficult	.16	.91	.13
Distracting	.08	.13	.86
Think about negative life events	-.23	.20	.31

Note: Bolded items indicate which items were averaged together to create the SSLA dimension.

Table 2. Bivariate correlations and descriptive statistics of health, psychosocial, self-selected leisure activities (SSLAs), and Pittsburgh Sleep Quality Index (PSQI) total scores.

	SSLA-PO	SSLA-DF	SSLA-DI	SSLA-TN	PC	JHAC	CESD	PSQI
SSLA-PO	–							
SSLA-DF	–.048	–						
SSLA-DI	.168**	.204**	–					
SSLA-TN	–.076	.079	.066	–				
PC	.009	–.048	.168***	.196**	–			
JHAC	.274**	.102#	–.024	–.111*	–.314**	–		
CESD	–.010	–.007	.068	.208**	.719**	–.387**	–	
PSQI	–.043	.005	.112	.180*	.368**	.013	.390**	–
Possible Range	0–6	0–6	0–6	0–6	–	12–60	0–60	0–21
M	3.92	1.88	3.10	1.72	.001	47.39	16.14	6.04
SD	.96	1.34	1.77	1.05	.89	6.50	10.13	3.35

Note: PC is perseverative cognition total score. JHAC is John Henryism active coping total score. CESD is CES-Depression total score. SSLA-PO is the SSLA dimension of positive mental state. SSLA-DF is the SSLA dimension of difficulty. SSLA-DI is the SSLA dimension of distraction. SSLA-TN is the SSLA dimension of thinking about negative events.

$p < .10$.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3. Summary of results for the multiple regression models, including the standardised beta for each predictor, and overall F values, df , R^2 for the respective SSLA dimensions (and all SSLA dimensions entered into the same MRM).

	SSLA-PO Model		SSLA-DF Model		SSLA-DI Model		SSLA-TN Model		All SSLA Model	
	CESD	PSQI	CESD	PSQI	CESD	PSQI	CESD	PSQI	CESD	PSQI
Age	–.022	.050	–.023	.045	–.026	.042	–.024	.039	–.027	.037
Sex	–.114*	–.061	–.117*	–.060	–.113*	–.058	–.098#	–.056	–.101#	–.057
Race	–.019	–.084	–.020	–.087	–.013	–.074	–.021	–.100	–.016	–.088
Education	.096#	–.020	.094#	–.028	.090#	–.029	.099#	–.007	.095#	–.009
BMI	.170**	.061	.179***	.073	.172**	.072	.167**	.049	.171**	.054
SSLA-PO	–.016	–.043	–	–	–	–	–	–	–.010	–.021
SSLA-DF	–	–	.038	.037	–	–	–	–	.010	–.017
SSLA-DI	–	–	–	–	.070	.111	–	–	.053	.085
SSLA-TN	–	–	–	–	–	–	.192***	.179*	.186***	.165*
F value	2.60*	.613	2.67*	.593	2.89**	.947	5.00***	1.59	3.44***	1.206
df	6, 348	6, 186	6, 348	6, 186	6, 348	6, 186	6, 348	6, 186	9, 345	9, 183
R^2	.043	.019	.044	.019	.047	.030	.079	.049	.082	.056

Note: Sex is dummy coded with female coded as a one. Race is coded with White as a 1, African-American as a 2, Hispanic-American as a 3, Asian-American as a 4, and others as a 5. Education is the higher of mom and dad's highest educational attainment where 1 = 8th grade or less, 5 = Bachelor's degree, and 9 = law degree. BMI is body mass index. CESD is CES-Depression total score. PSQI is total sleep quality score. SSLA-PO is the SSLA dimension of positive mental state. SSLA-DF is the SSLA dimension of difficulty. SSLA-DI is the SSLA dimension of distraction. SSLA-TN is the SSLA dimension of thinking about negative events.

$p < .10$.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Using MRMs that controlled for age, sex, race, education and BMI, we examined whether any of the SSLA dimensions predicted either depressive mood or sleep quality. As shown in Table 3, only higher SSLA-TN scores predicted significantly higher depression [$t(354) = 3.73$, $p < .0001$, $f^2 = .042$] and poor sleep quality [$t(192) = 2.47$, $p = .014$, $f^2 = .033$] scores. Neither SSLA-PO, SSLA-DF, nor SSLA-DI significantly predicted depression ($ps > .185$) nor sleep quality ($ps > .130$). When all the SSLA dimensions were examined in the same model, again only higher SSLA-TN scores predicted significantly higher depression [$t(354) = 3.54$, $p < .0001$, $f^2 = .039$] and poor sleep quality [$t(192) = 2.13$, $p = .035$, $f^2 = .025$] scores. Neither SSLA-PO, SSLA-DF, nor SSLA-DI significantly predicted depression ($ps > .326$) nor sleep quality ($ps > .256$).

Hypothesis 2a: Do PCs moderate the impact of the SSLA dimensions?

For hypothesis 2a, we repeated the analyses we conducted to test Hypothesis 1, however we also included PCs and the interaction of PCs and the SSLA dimension in the analyses. As shown in

Table 4. Summary of results for the multiple regression tests, including the standardised beta for each predictor, and overall *F* values, *df*, *R*² for perseverative cognition (PC) and the respective SSLA dimensions.

	SSLA-PO Model		SSLA-DF Model		SSLA-DI Model		SSLA-TN Model		All SSLA Model	
	CESD	PSQI	CESD	PSQI	CESD	PSQI	CESD	PSQI	CESD	PSQI
Age	-.072 [#]	.041	-.079*	.046	-.073 [#]	.049	-.071 [#]	.041	-.086*	.043
Sex	.046	.044	.045	.045	.054	.048	.035	.020	.033	.022
Race	-.001	-.084	.002	-.088	-.005	-.087	.000	-.093	-.003	-.093
Education	.025	-.029	.030	-.031	.023	-.032	.034	-.007	.033	-.008
BMI	.038	-.033	.056	-.027	.037	-.034	.053	-.036	.065	-.041
PC	.848***	.605*	.642***	.368**	.557***	.386**	.476***	.177	.450**	.297
SSLA-PO	-.026	-.050	-	-	-	-	-	-	-.020	-.021
PC*SSLA-PO	-.122	-.221	-	-	-	-	-	-	-.105	-.066
SSLA-DF	-	-	.067 [#]	.024	-	-	-	-	.073 [#]	-.015
PC*SSLA-DF	-	-	.112 [#]	.028	-	-	-	-	.033	-.047
SSLA-DI	-	-	-	-	-.040	.012	-	-	-.055	-.006
PC*SSLA-DI	-	-	-	-	.209**	.003	-	-	.178*	-.044
SSLA-TN	-	-	-	-	-	-	.117**	.141 [#]	.108**	.141 [#]
PC*SSLA-TN	-	-	-	-	-	-	.266***	.222 [#]	.220**	.244 [#]
<i>F</i> value	46.28***	4.04***	47.23***	3.92***	48.17***	3.90***	51.18***	4.73***	30.40***	2.65**
<i>df</i>	8, 324	8, 171	8, 324	8, 171	8, 324	8, 171	8, 324	8, 171	14, 318	14, 165
<i>R</i> ²	.533	.159	.538	.155	.543	.155	.558	.181	.572	.183

Note: Sex is dummy coded with female coded as a one. Race is coded with White as a 1, African-American as a 2, Hispanic-American as a 3, Asian-American as a 4, and others as a 5. Education is the higher of mom and dad's highest educational attainment where 1 = 8th grade or less, 5 = Bachelor's degree, and 9 = law degree. BMI is body mass index. CESD is CES-Depression total score. PSQI is total sleep quality score. SSLA-PO is the SSLA dimension of positive mental state. SSLA-DF is the SSLA dimension of difficulty. SSLA-DI is the SSLA dimension of distraction. SSLA-TN is the SSLA dimension of thinking about negative events.

[#]*p* < .10.

p* < .05; *p* < .01; ****p* < .001.

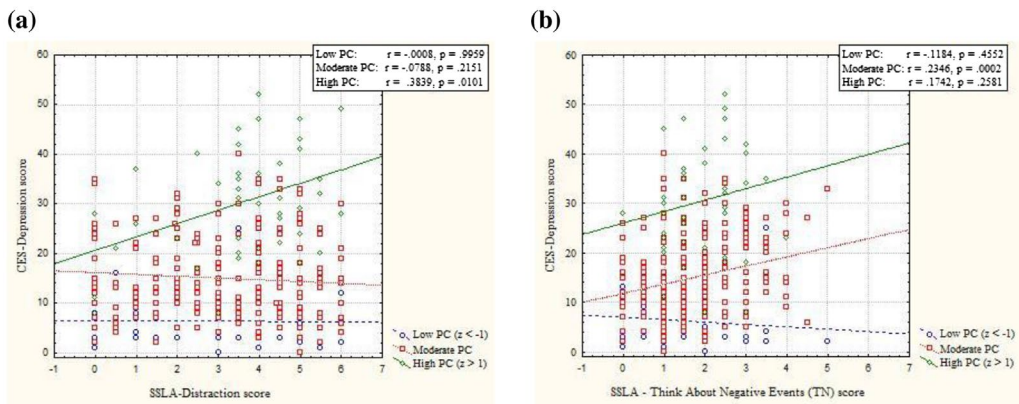


Figure 1. Interaction of (a) SSLA – Distraction (DI) score and (b) SSLA – Think about negative events (TN) score by perseverative cognition (PC) level in CESD-Depression scores.

Table 4, none of the interaction effects for PC with SSLA-PO or SSLA-DF were significant for depression or sleep quality. Significant interaction effects emerged between PCs and SSLA-DI and SSLA-TN for CESD scores. As shown in Figure 1(a), greater SSLA-DI scores predicted higher CESD-Total scores [$t(332) = 2.77, p = .006, f^2 = .025$] at higher but not moderate or lower PC levels. As shown in Figure 1(b), greater SSLA-TN scores predicted higher CESD-Total scores [$t(332) = 3.68, p = .0001, f^2 = .043$] at moderate but not higher or lower PC levels. When all of the SSLA dimensions and the interaction of these dimensions with PCs were included in the same model (see Table 4), the significant interaction effects remained between PCs and SSLA-DI [$t(332) = 2.26, p = .024, f^2 = .016$] and SSLA-TN [$t(332) = 2.95, p = .003, f^2 = .028$] for CESD scores.

Table 5. Summary of results for the multivariate regression tests, including the standardised beta for each predictor, and overall *F* values, *df*, *R*² for John Henryism active coping (JH) score and the respective SSLA dimensions (as well as all SSLA dimensions in the same MRM).

	SSLA-PO Model		SSLA-DF Model		SSLA-DI Model		SSLA-TN Model		All SSLA Model	
	CESD	PSQI	CESD	PSQI	CESD	PSQI	CESD	PSQI	CESD	PSQI
Age	-.021	.017	-.034	.013	-.050	.011	-.021	.012	-.047	.002
Sex	-.093 [#]	-.014	-.118*	-.037	-.099*	-.021	-.096 [#]	-.030	-.083 [#]	-.018
Race	-.028	-.117	-.016	-.099	-.018	-.122	-.015	-.101	-.024	-.128 [#]
Education	.082	-.048	.087 [#]	-.045	.079	-.046	.088	-.029	.080	-.029
BMI	.137**	.039	.161**	.061	.145**	.050	.138**	.024	.147**	.031
PC	-.125	.541**	-.285**	.181	-.117	.361**	-.238**	.231*	-.098	.534**
SSLA-PO	.583*	.917*	-	-	-	-	-	-	.047	.215
JH*SSLA-PO	-.639 [#]	-1.204***	-	-	-	-	-	-	.022	-.345
SSLA-DF	-	-	.595	.981 [#]	-	-	-	-	.142	-.057
JH*SSLA-DF	-	-	-.541	-.975 [#]	-	-	-	-	-.124	.036
SSLA-DI	-	-	-	-	1.220***	1.820***	-	-	1.056**	1.428*
JH*SSLA-DI	-	-	-	-	-1.190***	-1.800***	-	-	-1.049**	-1.428*
SSLA-TN	-	-	-	-	-	-	.748*	1.243**	.374	.556
JH*SSLA-TN	-	-	-	-	-	-	-.577 [#]	-1.074*	-.208	-.413
<i>F</i> value	9.90***	1.33	9.63***	.699	11.14***	2.26*	11.58***	1.80 [#]	7.61***	1.76*
<i>df</i>	8, 332	8, 175	8, 332	8, 175	8, 332	8, 175	8, 332	8, 175	14, 326	14, 169
<i>R</i> ²	.193	.057	.188	.031	.212	.093	.218	.076	.246	.127

Note: Sex is dummy coded with female coded as a one. Race is coded with White as a 1, African-American as a 2, Hispanic-American as a 3, Asian-American as a 4, and others as a 5. Education is the higher of mom and dad's highest educational attainment where 1 = 8th grade or less, 5 = Bachelor's degree, and 9 = law degree. BMI is body mass index. CESD is CES-Depression total score. PSQI is total sleep quality score. SSLA-PO is the SSLA dimension of positive mental state. SSLA-DF is the SSLA dimension of difficulty. SSLA-DI is the SSLA dimension of distraction. SSLA-TN is the SSLA dimension of thinking about negative events.

[#]*p* < .10.
p* < .05; *p* < .01; ****p* < .001.

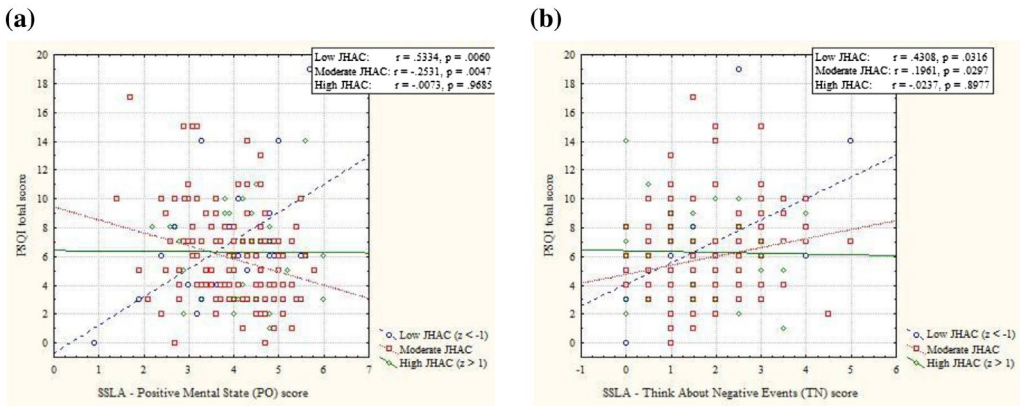


Figure 2. Interaction of (a) SSLA – Positive mental state (PO) score and (b) SSLA – Think about negative events (TN) by John Henryism active coping (JHAC) level in Pittsburgh Sleep Quality Index (PSQI) scores.

Hypothesis 2b: Does active coping moderate the role of SSLA dimensions?

For hypothesis 2b, we repeated the analyses we conducted to test Hypothesis 1, however we also included active coping and the interaction of active coping and the SSLA dimension in the analyses. As shown in Table 5, each MRM for PSQI except for SSLA-DF was significant while for CESD only SSLA-DI was significant. For positive mental state, as shown in Table 5 and Figure 2(a), greater SSLA-PO scores predicted higher PSQI scores at lower active coping levels but lower PSQI scores at moderate active coping levels [*t*(183) = -2.75, *p* = .007, *f*² = .043]. For distraction, as shown in Figure 3(a), greater SSLA-DI scores predicted higher CESD-Total scores [*t*(340) = -3.51, *p* = .001, *f*² = .039],

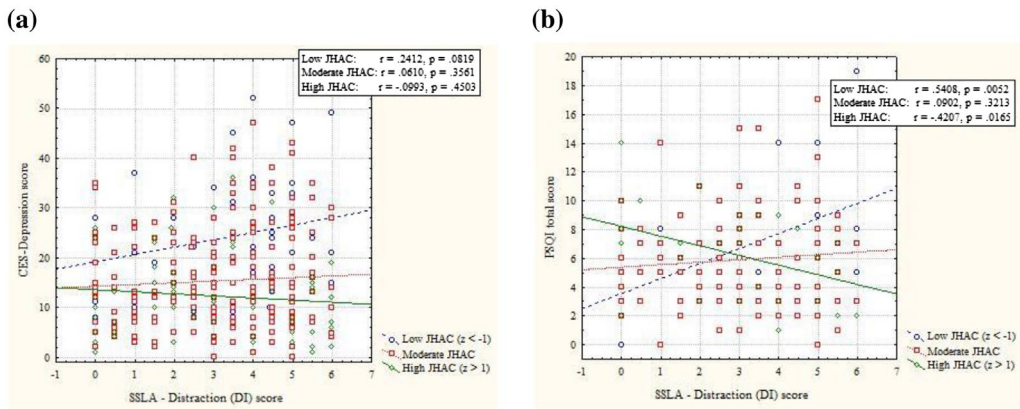


Figure 3. Interaction of SSLA – Distraction (DI) score by John Henryism active coping (JHAC) level in (a) CESD Depression and (b) Pittsburgh Sleep Quality Index (PSQI) scores.

marginally at lower (but not higher or moderate) active coping levels. As shown in Figure 3(b), greater SSLA-DI scores predicted higher PSQI scores at lower active coping levels but lower PSQI scores at higher active coping levels [$t(183) = -3.75, p = .0001, f^2 = .081$]. For thinking about negative events, as shown in Table 5, higher SSLA-TN was associated with higher CESD scores [$t(340) = -1.80, p = .073, f^2 = .010$], marginally at lower [$r(53) = .2685, p = .052$] and moderate [$r(231) = .2180, p = .0009$] active coping levels. As shown in Table 5 and Figure 2(b), greater SSLA-TN scores predicted higher PSQI scores [$t(183) = -2.31, p = .022, f^2 = .032$], at lower and moderate (but not higher) active coping levels.

Finally, when all of the SSLA dimensions and the interaction of these dimensions with active coping were included in the same model (see Table 5); the significant interaction effects remained between active coping and SSLA-DI for CESD scores [$t(340) = -2.81, p = .005, f^2 = .024$] and between active coping and SSLA-DI for PSQI scores [$t(183) = -2.52, p = .013, f^2 = .039$]. However, the interaction effects for active coping and SSLA-PO [$t(183) = -.687, p = .493$] and active coping and SSLA-TN [$t(183) = -.753, p = .453$] with PSQI scores were no longer significant. Using MRMs that controlled for age, sex, race, education and BMI, we examined whether any of the SSLA dimensions predicted either depressive mood or sleep quality.

Exploratory analyses

Because we sampled more women than men, we explored whether gender impacted any of the observed findings. We first explored whether women and men differed in their SSLA dimensions. *T*-tests indicated that men had higher SSLA-DF scores [2.18 ± 1.43 vs. 1.79 ± 1.31 ; $t(360) = -2.34, p = .020$], and that women had marginally higher SSLA-PO scores [3.97 ± 0.95 vs. 3.75 ± 0.97 ; $t(360) = 1.95, p = .052$]. However, men and women did not differ on SSLA-DI [3.08 ± 1.76 vs. 3.16 ± 1.82 ; $t(360) = -0.386, p = .700$] nor SSLA-TN [1.77 ± 1.03 vs. 1.57 ± 1.08 ; $t(360) = 1.51, p = .132$]. Then, we tested gender as a moderator of the effect of the SSLA dimensions on depressive mood and sleep quality. In the MRMs used to test H1, we also entered the interaction between gender and the SSLA dimensions. Gender did not significantly interact with any dimensions to predict depression ($ps > .195$) or sleep ($ps > .122$).

Discussion

The overarching goals of this study were to test whether there are in fact different SSLA dimensions, whether those dimensions differentially predict health and if those associations are moderated by PCs and active coping. In fact, not all leisure activities are beneficial independently and it depends on how

the activity is performed (e.g. watching television may still have positive health benefits) (Kleiber et al., 2011). The key to whether an SSLA is beneficial depends on how the activity is performed.

Accordingly, factor analytic tests produced three unique dimensions for engagement in SSLAs: positive mental state, difficulty doing the activity and distraction; the dimensions that we identified a priori. An additional dimension – thinking about negative events – was included in analyses despite it not loading as expected with the distraction dimension. In retrospect, its independence is not surprising given that these facets are often measured distinctly with surveys assessing rumination (Nolen-Hoeksema & Morrow, 1991). Given this initial determination of these relatively independent dimensions, future work should aim to replicate the measurement of these dimensions and test their relative independence with confirmatory factor analysis. Moreover, there may be other critical dimensions to measure. For example, our prior work has shown the value of absorption over relaxation (Zawadzki, Graham et al., 2013a; Zawadzki, Smyth et al., 2013b), yet it is unclear if absorption would be similar to the dimensions we observed or an extra feature of SSLAs. Other key dimensions from recent studies may include frequency, duration of engagement and solitary versus communal activity (Kleiber et al., 2011).

As expected, the SSLA dimensions differentially predicted health, but only thinking about negative events while doing the SSLA was significant, predicting worse sleep quality and more depressive symptoms. It is unclear why the other dimensions were unrelated. Perhaps it is harder for people to get optimal awareness of their moods during SSLAs or maintain difficult SSLAs consistently. We may need to assess positivity in SSLAs in a more longitudinal context to tap how changes in mood during SSLAs uniquely relate to these health outcomes. By following individuals over time and context, we would get more precision in resolving which dimensions of SSLAs may enhance health.

We also explored if the dimensions were equally vital for health across individuals or if PCs and active coping moderated associations. Higher levels of distraction and thinking about negative events were each linked with greater depression for those with higher PCs. The thinking about negative events results is logical as high PC is linked with strong reflections on negative events (Brosschot et al., 2010). The finding that distraction is linked with higher depression at higher PC may suggest that distraction in SSLAs is more of a short-term form of avoidant coping that offers temporary escape from having to deal more directly with daily life events (Zawadzki, Smyth et al., 2013b). Higher levels of distraction were linked with less depressive symptoms/sleep problems for high (but not low) active coping persons. Perhaps the optimistic and high striving facets and related sense of efficacy found in active coping (James, 1994) enhance efforts to distract oneself from daily stress and supplement positive affect, and thus the health benefits of SSLAs. Notably, leisure may be a resource essential for active coping to be positive, and conversely, ineffective SSLAs (e.g. high TN SSLAs) may be particularly deleterious.

Potential limitations and future directions

This study was an important test on expanding upon whether leisure has dimensions that differentially relate to health; nevertheless some limitations and unanswered questions exist that can guide future work. First, the range of possible dimensions is likely more complex than assessed in the current self-report survey. Future work will include an interview that details more broadly what aspects of SSLAs work best. Recent qualitative approaches like analysing recorded and transcribed interviews using constructionist grounded theory have shown success in this regard (Kleiber et al., 2011) and thus may be useful extensions of the current empirical approach. For instance, we can flesh out how the difficulty feature works in the context of skills, social support or free time (Abuhamdeh & Csikszentmihalyi, 2012; Havitz et al., 2013). Such an approach along with behavioural measures, observation and spouse/partner's report of engagement in leisure might also reveal additional dimensions that neither we nor the past literature have considered important (Kleiber et al., 2011).

Second, given the cross-sectional nature of this study, the precise theoretical pathways for the benefits of one's SSLA(s) across time and social context are left to be uncovered. Experimental studies that assign people to complete SSLAs, and to engage with certain dimensions of SSLAs, would help to

demonstrate a causal link between leisure and better health (Iso-Ahola & Mannell, 2004; Sonnentag et al., 2008). Experience sampling studies that track people's engagement in SSLAs and resultant mood, stress and momentary health levels would also help to reveal how SSLAs have their effect, and whether the SSLA dimensions are differentially related to different outcomes (Siddiquee et al., 2016; Zawadzki et al., 2015). For instance, in a four-year study of South African adolescents, each unit increase in leisure boredom at baseline was associated with notable increases in the likelihood of having used alcohol, cigarettes and marijuana in the previous 4 weeks (Sharp et al., 2011). So, then a longitudinal approach will afford us a more precise picture of how SSLAs and related mechanisms relate to daily health when persons are doing them versus when they are not doing them.

Finally, these results need to be replicated in more diverse populations to test generalisability, including full-time workers and caregivers who may have less time to engage in SSLAs, and/or who tend to experience more stress and cope in more PC-prone ways (Brosschot et al., 2010). Moreover, additional work should test whether results differ by gender as some work has suggested a moderating effect (Kleiber et al., 2011). This potential difference is driven by the fact that women – despite having more diverse leisure interests than men (Kleiber et al., 2011) – may have less access to leisure time than men because of the brunt of housework and childcare traditionally often falls to women (Henderson & Hickerson, 2007). Thus, women may not just do less leisure, but when they do it, that leisure may be shorter or even involve other family members that can change the experience. Indeed, in the present study, we saw some differences between how women and men did their SSLA, with men surprisingly reporting more difficulty in doing their leisure and women reporting their leisure as more positive. But women and men did not differ on distracting and thinking about negative events, which was the dimension that showed relationships with depressive symptoms and sleep quality. Perhaps more directly, gender did not moderate the effects of the dimensions on health. Still, more work would benefit by testing how women and men do leisure, the complex ways it differs including across leisure's dimensions and whether those differences lead to differential effects on health.

Conclusions

To conclude, engaging in SSLAs in certain ways is linked with health status when accounting for levels of active coping and PC. Few people would argue that leisure is generally good for you, yet leisure is a complicated construct. This paper suggested an even more nuanced approach to studying leisure – namely that leisure may be a dimensional phenomenon with health benefits reliant on those dimensions. Indeed, results consistently suggested that one type of dimension was negative – thinking about negative events while doing the leisure activity. These results suggest that one could take any intervention a person is currently doing, and enhance that activity by promoting some dimensions or lessening others. Finally, the consistent moderation effects of PCs and active coping remind us again that not all people are identical and thus points to critical new directions for how to study leisure to improve individuals' health and well-being.

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