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The State-Trait Model of Cheerfulness: Psychometric Validation, Cross-Cultural Findings, and its Association with Well-Being

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A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Psychology

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ABSTRACT

The State-Trait Cheerfulness Inventory (STCI) measures the temperamental basis of the sense of humor involving cheerfulness, seriousness, and bad mood. This manuscript-based dissertation introduces novel research findings that incrementally advances knowledge and understanding of the state-trait model of cheerfulness. The present research addresses two main objectives to: (1) assess the reliability and validity of the newly constructed measures of the STCI and (2) broaden the understanding of the theoretical framework of the STCI and its association with humor and well-being. Studies One to Four provide evidence for the reliability and validity of the English (state and trait short forms), Italian (standard trait form), and Chinese (standard trait form) versions of the STCI. While the association between the state-trait model of cheerfulness with well-being has been documented in the literature, it has traditionally lent itself readily to zero-order correlational research. To meet the second objective, analysis of individual differences may further clarify the association between traits cheerfulness, seriousness, and bad mood with well-being. Studies Five to Eight address the association between cheerfulness and well-being through the lenses of humor traits (Study Five), self-esteem and behavioural activation (Study Six), resiliency (Study Seven), and creativity (Study Eight). The results provide psychometric evidence for the newly developed versions of the tool and new insight that advances a coherent and multifaceted theoretical framework on the pathways in which the state-trait model of cheerfulness is associated with humor and psychological well-being.

KEYWORDS: cheerfulness; humor; seriousness; bad mood; trait; state

SUMMARY FOR LAY AUDIENCE

The State-Trait Cheerfulness Inventory (STCI) measures the temperamental basis of the sense of humor involving cheerfulness, seriousness, and bad mood. This manuscript-based dissertation introduces novel research findings that incrementally advances knowledge and understanding of the state-trait model of cheerfulness. The present research addresses two main objectives to: (1) assess the reliability and validity of the newly constructed measures of the STCI and (2) broaden the understanding of the theoretical framework of the STCI and its association with humor and well-being. Studies One to Four provide evidence for the reliability and validity of the English (state and trait short forms), Italian (standard trait form), and Chinese (standard trait form) versions of the STCI. While the association between the state-trait model of cheerfulness with well-being has been documented in the literature, it has traditionally lent itself readily to zero-order correlational research. To meet the second objective, analysis of individual differences may further clarify the association between traits cheerfulness, seriousness, and bad mood with well-being. Studies Five to Eight address the association between cheerfulness and well-being through the lenses of humor traits (Study Five), self-esteem and behavioural activation (Study Six), resiliency (Study Seven), and creativity (Study Eight). The results provide psychometric evidence for the newly developed versions of the tool and new insight that advances a coherent and multifaceted theoretical framework on the pathways in which the state-trait model of cheerfulness is associated with humor and psychological well-being.

COAUTHORSHIP STATEMENT

Chloe Lau was the lead investigator across all these studies. In these projects, Chloe Lau took the lead role in literature review, development of the research question, data cleaning, data analysis, interpretation of data, and manuscript writing. Five of eight studies have been published and three are under review in various journals. References are provided below in the order in which they appear within the dissertation.

Lau, C., Chiesi, F., Hofmann, J., Ruch, W., & Saklofske, D.H. (2020). Development and linguistic cue analysis of the state-trait cheerfulness inventory – short form. Advance online publication in *Journal of Personality Assessment*.

Lau, C., Chiesi, F., Saklofske, D.H., & Yan, G. (2019). What is the temperamental basis of humour like in China? A cross-national examination and validation of the standard version of the state–trait cheerfulness inventory. *International Journal of Psychology, 55*(2), 264–272.

Lau, C., Chiesi, F., Hofmann, J., Ruch, W., & Saklofske, D.H. (2019). The Italian version of the state-trait cheerfulness inventory trait form: Psychometric validation and evaluation of measurement invariance. Advance online publication in *Journal of Psychoeducational Assessment*. <https://doi.org/10.1177/0734282919875639>

Lau, C., Chiesi, F., Ruch, W., & Saklofske, D.H. (2020). Is cheerfulness and satisfaction with life mediated by self-esteem and behavioral activation? A serial mediation model. Advance online publication in *Personality and Individual Differences*.

Lau, C., Chiesi, F., & Saklofske, D.H. (2019). The combinative role of traits cheerfulness and seriousness in predicting resiliency and well-being: A moderated mediation model. Advance online publication in *Personality and Individual Differences, 151*, 109515. <https://doi.org/10.1016/j.paid.2019.109515>

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CHAPTER 1: Introduction

1.1. Introduction to the Psychology of Humor

Across time and culture, humans have integrated humor appreciation and production as part of social interaction (Bainum, Lounsbury, & Pollio, 1984). An average person laughs approximately 18 times a day, and much of this laughter occurs during social interactions (Martin & Kuiper, 1999). From a trait-based psychological perspective, humor is described as the cognition, behaviours, and affect that constitute amusement, mirth, and exhilaration experienced by the individual and expressed to the surrounding environment (Ruch, Kohler, & van Thriel, 1996; Ruch, 1997; Ruch & Hofmann, 2012). More specifically, the sense of humor can be expressed as a style, representing an individual's typical behaviour (e.g., cheerfulness, predominant mood, aesthetic perception). Humor can also be expressed as maximal behaviour (i.e., humor creativity, humor production), which represents the skill or competence to create humorous comments that can be measured as quantity (e.g., number of jokes) or quality (i.e., strong agreement content is funny, creative, and witty; Brodzinsky & Rubien, 1976; Ruch & Hofmann, 2012).

To further investigate the conceptualization of humor as a trait, Samson and Ruch (2008) investigated 23 humor-related constructs and qualities (e.g., merry/funny, ingenious/witty, imaginative, absurd) and found that two dimensions of affect ("cute" vs. "macabre") and cognition (e.g., "funny" vs. "sophisticated") accounted for all 23 qualities (as cited in Ruch, 2008). Possessing humorous qualities have been found to be beneficial in producing positive outcomes in many aspects of the human experience, including acquiring mating success, intelligence, positive self-image, decreased distress

in illness, and greater self-efficacy in the workplace (Abel, 1998; Carver et al., 1993; Geisler & Weber, 2010; Greengross & Miller, 2011).

Over the years, findings emerged in the trait-based humor literature that point to the facilitative effects of the cognitive and affective components in the sense of humor that may act as an effective coping strategy under unique adversities (e.g., Martin & Lefcourt, 1983). Interestingly, this view may be implicitly held by the general public, as a greater number of societal events related to dying was found to be positively associated with the number of death-related cartoons in the media (Matzo & Miller, 2009). Amongst the first to describe the association between humor and distress was Sigmund Freud (1905), who hypothesized that non-tendentious joking (i.e., jokes that disguise the individual's hidden intents) and tendentious humor joking (i.e., jokes that express libidinal impulses of sex and aggression) allow inhibitory energy to be dissipated through laughter (Freud, 1953). More recent stress-moderating theories of humor proposed that humor mitigates the undesirable effects of negative emotions through a cognitive shift that allows the situation to appear less threatening and more distant to allow proper management (Abel, 1998; Abel & Maxwell, 2002; Kuiper, McKenzie, & Belanger, 1995; Martin, 2001; Martin, Kuiper, Olinger, & Dance, 1993). These findings align with other theories in the social psychology and personality literature. A cheerful composure and interactive style despite negative events has been hypothesized to be the temperamental roots of humor (Ruch, 2008; Ruch et al., 1996) and humor plays an important role in effective cognitive change through emotional regulation (Ochsner & Gross, 2008; Samson & Gross, 2012).

While it is commonly believed that humor as a trait is almost exclusively related to positive psychological effects and health benefits, there are mixed findings in the empirical literature in regard to health and differential consequences in well-being (Kuiper, Grimshaw, Leite, & Kirsh, 2004; Kuiper, Martin, & Olinger, 1993). In the humor and longevity literature, the cognitive sense of humor was associated with survival from mortality related to cardiovascular diseases and infections 15 years later amongst women (Romundstad et al., 2016). Lai et al. (2010) found that higher coping humor scores were associated with better immune functioning in older adults, after the effects of self-esteem and demographic variables were controlled for.

On the contrary, sense of humor, evaluated as a trait, assessed in 1995 failed to predict any physical health and well-being benefits in 1998 in a sample of Finnish police officers (Kerkkanen, Kuiper, & Martin, 2004). In fact, sense of humor was associated with increased obesity, cardiovascular risk, and smoking (Kerkkanen et al., 2004). When sense of humor was evaluated as the temperamental trait of cheerfulness in childhood, it may be associated with carelessness about health, consumption of alcohol, and engagement in riskier behaviour in adulthood compared to less cheerful counterparts (Schwartz et al., 1995). The question of whether humor as an ability predicts better physical outcomes was also investigated. Rotton (1992) found that humorists (i.e., comedians, comedy writers, authors in humor literature) did not live longer than serious literary figures and entertainers. Contrary to the author's expectations, entertainers and writers died at a younger age compared to the average United States population even though the national United States population average consisted of children that did not survive into adulthood (Rotton, 1992). Similarly, Merz et al. (2009) found that while

coping humor was found to be negatively associated with a variety of health benefits (i.e., disease severity, pain, disability, and distress), these associations were not significant after controlling for covariates (i.e., education, income, and age) cross-sectionally or longitudinally. Clearly, these results call for the need to further examine how individual differences within humor is evaluated that account for differential outcomes.

1.2. Assessment of Individual Differences in Humor

Early psychological models of humor provided global humor metrics that can capture an overall “sense of humor”, including the coping humor scale (CHS), Situational Humor Response Questionnaire (SHRQ; Martin & Lefcourt, 1983), and 3 Witz-Dimensionen Humor Test (Ruch, 1992). However, the obvious limitation to unidimensional measures is that the nature of humor is a multidimensional phenomenon that encompassed a function (e.g., pro-social or mean-spirited) and fulfills complex needs for the individual (e.g., engage with others, mock others). Moreover, humor and humorlessness must be represented. Although the literature shows humor as a global trait is generally negatively associated with distress variables like depression (e.g., Thorson & Powell, 1994), it becomes important to evaluate individual differences that facilitate or inhibit this association.

To address the aforementioned limitations, Martin, Puhlik-Doris, Larsen, Gray, and Weir (2003) have developed the Humor Styles Questionnaire (HSQ), an international, widely used self-report instrument that measures two functions of benign styles of humor (i.e., self-enhancing, affiliative) and two maladaptive styles (i.e., aggressive, self-defeating) relevant for psychological well-being. When measuring humor, mixed findings seem to emerge when humor was assessed as coping humor or

dispositional humor (e.g., with the CHS and SHRQ), but multidimensional measures of humor using the HSQ suggested specific humor styles play unique roles. According to Martin et al. (2003), assessment of multidimensional humor styles may reflect one's tendency to express oneself in an adaptive or maladaptive manner, which could ultimately lead to ability or inability to achieve positive reframing of adversities. The HSQ demonstrated strong evidence of construct validity and has been used in more than 125 published studies in over 30 languages (Martin et al., 2003; Martin & Kuiper, 2016).

In regard to the benign styles of humor, affiliative humor involves sharing jokes in a witty manner to enhance interpersonal relationships and is associated with decreased levels of anxiety, depression, and attachment avoidance (Cann, Norman, Welbourne, & Calhoun, 2008; Chen & Martin, 2007; Frewen, Brinker, Martin, & Dozois, 2008; Martin et al., 2003; Yip & Martin, 2006). Self-enhancing humor involves using humor to maintain a positive perspective and humorous outlook in life for a realistic perspective in stressful situations and is associated with mental toughness and reduced anxiety (Cann et al., 2008; Veselka, Schermer, Martin, & Vernon, 2010). Self-enhancing humor may be conceptualized as a humorous coping strategy, as it can positively change one's perspective under stressful scenarios (Martin et al., 2003). Recent evidence suggests benign humor styles seem to have psychosocial benefits beyond individual cognitive and affective shift (Kuiper, Aiken, & Sol Pound, 2014). When affiliative and self-enhancing humorous comments from a casual acquaintance were presented to unacquainted judges, judges revealed more positive ratings and less social rejection of the acquaintance (Kuiper, Klein, Vertes, & Maiolino, 2014).

Unlike the affiliative styles, aggressive humor involves teasing and demeaning others to elevate oneself and self-defeating humor involves self-ridicule, teasing one's own weaknesses, and making fun of oneself to gain social acceptance (Martin et al., 2003). Maladaptive humor styles are associated with negative psychological outcomes, including borderline personality characteristics, spitefulness, loneliness, sub-clinical psychopathy and Machiavellianism, and parental rejection (Kazarian, Moghnie, & Martin, 2010; Schermer et al., 2015; Veselka, Schermer, Martin, & Vernon, 2010; Vrabel, Zeigler-Hill, & Shango, 2017). Moreover, individuals revealing higher levels of self-defeating and aggressive humor are perceived less favorably, compared to individuals engaging in benign humor styles (Kuiper, Kirsh, & Leite, 2010; Zeigler-Hill, Besser, & Jett, 2013). Self-defeating humor may provide denial and escape for underlying negative feelings, while aggressive humor allows one to gain power or demonstrate superiority within a social interaction (Martin et al., 2003). Recent correlational studies aligned with this view, as disinhibition was positively associated with the aggressive humor and self-defeating humor style and antagonism was positively associated with the aggressive humor style (Zeigler-Hill, McCabe, & Vrabel, 2016).

Recent criticism questions the utility of the HSQ in personality measurement (Heintz, 2017a, 2017b; Heintz & Ruch, 2015, 2016, 2018; Ruch & Heintz, 2014). Specifically, these authors pointed at multiple limitations in the HSQ, including small effects related to well-being when personality was controlled for, non-humorous components dominating humorous aspects, and lack of convergence between conceptualization of humor styles. Heintz and Ruch (2018) suggested significant changes

should be adapted for the construct and the scale. Findings across these studies denote a need for various measures of humor-related traits to further validate findings.

Other multidimensional approaches of humor have also been widely studied. When characterizing self-report behavior, the Humor Behavior Q-Sort Deck (HBQD) evaluates non-redundant and observable humor behaviours that are categorized into five dimensions of humor (Craik, Lampert, & Nelson, 1996). These five dimensions include (1) socially warm vs. cool, (2) reflective vs. boorish, (3) competent vs. inept, (4) earthy vs. restrained, and (5) benign vs. mean-spirited humor (Craik et al., 1996). Ruch and Proyer (2009) proposed three dispositions toward ridicule and laughter, including gelotophobia (i.e., the fear of being laughed at), gelotophilia (i.e., the joy of being laughed at), and katagelasticism (i.e., the joy of laughing at others). These dispositions are commonly measured using the self-report instrument named PhoPhiKat, which is short for the phobia (i.e., fear of being laughed at), philia (i.e., love of being laughed at), and kategelasticism (for long version see Ruch & Proyer, 2009; for short version see Hofmann, Ruch, Proyer, Platt, & Gander, 2017). A growing number of multidimensional scales have been documented in the empirical literature demonstrating strong psychometric properties, including the Comic Styles Markers questionnaire (Ruch, Heintz, Platt, Wagner, & Proyer, 2018), Sense of Humour Scale Parallel Form (Ruch & Heintz, 2018), and the Benevolent and Corrective Humor Scale (BENCOR; Heintz et al., 2018). The BENCOR measure assesses benevolent and corrective humor that have demonstrated strong reliability and validity across 25 samples in 22 countries (Heintz et al., 2018, 2019). Specifically, benevolent humor defines using humor to treat human weaknesses and wrongdoings compassionately, while corrective humor aims at bettering

human weaknesses using humor as temperament and virtue (Heintz et al., 2018, 2019; Ruch & Heintz, 2016). Clearly, there is a large movement towards adequately capturing a comprehensive psychological profile of humor as a multidimensional trait.

1.3. Humor as a Temperament

Although the vast majority of humor personality research focused on traits, the sense of humor can be represented as an individual's typical behaviour (i.e., trait-like characteristics) or their present state of mind (i.e., state-like characteristics) in responding to, engaging in, or producing humor (Ruch, Köhler, & van Thriel, 1996). The variability between and within persons for readiness to engage in humor demonstrates specific traits and states could boost or decrease an individual's threshold for amusement (Ruch and Hofmann, 2012). While expression of humor is expected to vary across time and space, the affective and cognitive component of humor is likely universal (Ruch and Hofmann, 2012). Ruch, Köhler, and van Thriel (1996, 1997) postulated that interindividual and intraindividual differences in personality characteristics allow individuals to laugh more easily and engage in humor production. The multidimensional aspect of this model considers the temperamental basis of the sense of humor to be a combination of high trait cheerfulness, low seriousness, and low bad mood that would contribute to exhilaration (Carretero-Dios, Benítez, Delgado-Rico, Ruch, & López-Benítez, 2014; Ruch et al., 1996). For instance, an individual with high trait cheerfulness who is ill-humoured and/or in a serious frame of mind may not display positive affect or be engaged in playful interactions that one may expect for a cheerful person (Ruch et al., 1996; Ruch & Carrell, 1998; Ruch & Hofmann, 2012). Empirical data from Ruch and colleagues (1996, 1997) confirmed that trait cheerfulness accounted for 90% of the variance in sense of humor

scale scores. While trait cheerfulness accounted for most of the variance in the sense of humor, seriousness and bad mood also demonstrated incremental validity (Ruch & Carrell, 1998). Two higher-order factors of cheerfulness and seriousness were extracted in various humor measures (Ruch & Heintz, 2014).

Cheerfulness became a variable of interest in psychological research for more than 100 years, with philosophical and historical underpinnings of its terms of origin (e.g., Morgan et al., 1919). Nietzsche described a “cultivated second nature” form of cheerfulness, one that is more nuanced than a nondeliberate and unreflective affective attachment to the world and life itself (Lanier Anderson & Cristy, 2017). In other words, true cheerfulness is the ability to see life of a problem and enables one to love life again, not “in spite of” adversity, but “because” of adversity (Lanier Anderson & Cristy, 2017). The form of cheerfulness Nietzsche describes is radically non-naïve, which involves a deeper conceptualization and cultivation through philosophical thought than simply unreflected positive affect (Lanier Anderson & Cristy, 2017). Reflecting the multifaceted nature of cheerfulness, Ruch and colleagues (1996) defined the construct of cheerfulness as a high prevalence of cheerful mood, the tendency to laugh easily and frequently, broad range of elicitors for cheerfulness, a cheerful interaction style, and a composed view of adverse life circumstances. While cheerful individuals show robustness of cheerful mood, they also maintain a “cheerful composure” when encountering adverse and unexpected situations (Ruch & Hofmann, 2012). Indeed, experimental evidence confirmed that trait cheerfulness is more robust against inductions of negative mood and emotions (Ruch & Hofmann, 2012). Moreover, cheerful individuals maintained positive emotions and less

negative emotions and showed more Duchenne smiling when seeing distorted photographs of themselves (Beerman & Ruch, 2011; Hofmann, 2018).

Indeed, trait cheerfulness is a narrow-level personality trait under the broader-level trait extraversion, but cheerfulness as an independent variable generally acts as a better predictor for specific humor-induced positive affect (Ruch & Hofmann, 2012). Cheerfulness and seriousness outperform broad personality traits in accounting for the variance in humor behaviors (Wagner & Ruch, 2020). Cheerfulness demonstrated conceptual overlaps with extraversion (Carretero-Dios et al., 2014; Wrench & McCroskey, 2001). While extraverts show more social smiles independent of stimuli, cheerful individuals displayed more Duchenne smiles, as opposed to social smiles (Ruch & Hofmann, 2012). Trait cheerfulness also has greater predictive power for humor-induced smiling and laughter compared to trait extraversion and measures of mood states and affect (e.g., elation and positive affect; Ruch, 1997; Ruch & Hofmann, 2012).

While cheerfulness allows for amusement to be facilitated, individuals who are serious and/or in a bad mood may be less inclined to express positive affect or smile at a stimulus that can be perceived as humorous (Ruch et al., 1996). In this lens, traits seriousness and bad mood have been introduced as forms of humorlessness (Ruch et al., 1996). Seriousness represents a tendency in taking ideas and thoughts into consideration thoroughly and intensively, planning ahead and setting long-range goals, and preferring activities for which concrete, rational reasons can be produced (Ruch et al., 1996). Behaviourally, seriousness may be conveyed as a sober, object-oriented communication style (Ruch et al., 1996). Bad mood is conceptualized as sadness (i.e., despondent and distress) and ill-humoredness (i.e., grumpy, sullen, or grouchy feelings). It is worth

noting that cheerfulness, as a psychological construct, is a quasi-trait, which is a unipolar construct measuring presence or absence of a trait (e.g., cheerful vs. non-cheerful; Reise & Waller, 2009). This is in contrast with a bipolar trait, in which both extremes on opposite ends represent variations in two meaningful entities (e.g., cheerful vs. in a bad mood). As such, evidence that cheerfulness is absent may not be considered evidence that bad mood is present.

1.4. The State-Trait Cheerfulness Inventory

To promote reliable and valid assessment of the temperamental basis of humor, the State-Trait Cheerfulness Inventory (STCI) traits and states versions were developed. The STCI–trait version is a temperamental measure that assesses latent traits of both cheerfulness and bad mood as conceptually distinct emotional facets, and seriousness as a cognitive and attitudinal facet (Ruch et al., 1996, 1997). There are currently two validated trait versions of the STCI in the literature, including the international version consisting of 106 items and a shorter standard version consisting of 60 items (Hofmann, Carretero-Dios, & Carrell, 2018; Ruch et al., 1996). Each of the three factors include specific theoretical facets related to the factor that each item is intended to measure (Ruch et al., 1996). For cheerfulness, theoretical facets include prevalence of cheerful mood, low threshold for smiling and laughter, composed view of adverse life circumstances, broad range of active elicitors of cheerfulness and smiling/laughter, and generally cheerful interaction style (Ruch et al., 1996). For seriousness, theoretical facets include prevalence of serious states, perception of even everyday happenings as important and taking it into consideration thoroughly and intensively, tendency to plan ahead and set long-range goals, tendency to prefer activities for which concrete and rational reasons can be

produced, and preference for a sober, object-oriented communication style (Ruch et al., 1996). For bad mood, theoretical facets include prevalence of bad mood, prevalence of sadness, sad and ill-humoured behavior in cheerfulness-evoking stimuli, and prevalence of ill-humoredness (Ruch et al., 1996). This instrument was developed based on the conceptualization of the theoretical model that while high cheerfulness plays a prominent role in the tendency to engage in humor-related activities, heightened traits seriousness and bad mood could affect frequency, intensity, and duration of exhilaration (Ruch et al., 1996).

The model accounts for general tendencies (i.e., traits) and present states as well. State cheerfulness represents positive affectivity related to feeling merry, being in good spirits, and readiness to engage in humor-related activities at the present moment (Ruch et al., 1997). Similarly, state seriousness represents a serious frame of mind and the readiness to think and communicate seriously. State bad mood represents sad mood or ill-humoured mindsets, which mitigates the preference or ability to engage in humor (Ruch et al., 1997). Evidence suggests these states show more modest test-retest reliabilities compared to their trait counterparts (Ruch et al., 1996; 1997). Indeed, state measures from the STCI amalgamated showed stronger correlations with the respective traits than single state measures, further validating the importance of measuring distinct traits and states (Carretero-Dios, Eid, & Ruch, 2011).

In terms of the state-trait association, the respective state-trait correlations of homologous factors yielded the highest correlations (Ruch et al., 1996, 1997). Carretero-Dios and colleague's (2011) study of latent state-trait (LST) differences found strong positive correlations between traits and their respective aggregated states (i.e., upon

repeated assessment). In this study, observed variables were decomposed into self-report traits, peer-report traits, states, and error components through multitrait-multimethod analyses. The authors concluded 67% of the variance from the aggregated state ratings was due to method-specific effects and not shared with the self-report trait version (Carretero-Dios et al., 2011). Lopez-Benitez and colleagues (2018) conducted latent state trait (LST) analyses and found consistency coefficients for traits far outweighed the occasion specificity. These results suggest that most of the variance in the LST reliability coefficient captured stable interindividual differences for traits. In contrary, the LST occasional specificity coefficients were greater than the consistency values for state measures, which further distinguishes the fluctuating nature of the state and the stability of the trait. The occasional specificity coefficient to consistency coefficient difference was lower for state seriousness than the two affective components of the model. These results suggest that seriousness may exhibit less state-like characteristics compared to cheerfulness and bad mood.

Ruch (1997) reported that individuals with high trait cheerfulness reported greater state cheerfulness changes compared to low trait cheerfulness counterparts through positive affective induction. Lopez-Benitez, Acosta, Lupianez, and Carretero-Dios (2018) further demonstrated that individuals with high trait cheerfulness reported greater fluctuations (i.e., larger increases and decreases) in state cheerfulness compared to their low trait cheerfulness counterparts. Contrary to the authors' hypothesis, individuals with high trait cheerfulness reported greater changes in affect compared to their low trait cheerfulness counterparts for the negative affective induction as well. Hence, Lopez-Benitez and colleagues (2018) concluded that cheerfulness may promote greater

expression of affect, allowing cheerful individuals to better reflect, monitor, and manage their emotions.

Over the years, self-report state (e.g., Ruch et al., 1997; López-Benítez et al., 2017), trait (e.g., Ruch et al., 1996; Carretero-Dios et al., 2014; Chen, Ruch, & Li, 2017), peer-report (Ruch et al., 1996), child/adolescent (Wagner & Ruch, 2020), and couple versions (e.g. Tapia-Villanueva, Pereira, & Molina, 2014) have been translated to over 10 different languages (Ruch & Hofmann, 2012). Experimental studies have validated different methodology in measuring these traits using multitrait multimethod approaches for sources of individual differences (Carretero-Dios, Eid, & Ruch, 2011). These findings demonstrated convergent and discriminant validity across instruments in measuring traits cheerfulness, seriousness, and bad mood when using these different methods (i.e., self-report trait form, state-form for eight consecutive days, peer-report; Carretero-Dios et al., 2011). Carretero-Dios and colleagues (2011) reported latent correlations between self-reported trait scores and common peer ratings scores were between .71 and .80, suggesting high convergent validity.

1.5. Cheerfulness and Well-Being

Beyond the theoretical model and measurement properties, research has consistently indicated the importance of cheerfulness, as an affective state and personality trait, in predicting psychological well-being (Lopez-Benitez, Acosta, Lupianez, & Carretero-Dios, 2017; Ruch & Hofmann, 2012). Researchers proposed trait cheerfulness predicts more engagement in humor and fun types of interactions, leading to greater positive affect and psychosocial well-being (Ruch & Hofmann, 2012). The evidence in the literature strongly aligns with this model. High trait cheerful individuals showed

greater facial signs of frequent and intense exhilaration when interacting with a clowning experimenter and greater state cheerfulness when listening to funny tapes (Ruch, 1997). In a study investigating trait cheerfulness in a hospital clown intervention, high trait cheerful individuals showed more Duchenne smiles and experienced positive emotions to a greater extent than their low trait cheerful counterparts (Auerbach, 2017). Trait cheerfulness predicts positive affect and Duchenne smiling when interacting with an amusing experimenter, bloopers, and distorted photographs of the self (Beerman & Ruch, 2011; Hofmann, 2018; Ruch, 1997; Ruch & Hofmann, 2012). Indeed, high trait cheerful individuals also endorsed less fear of being laughed at by others and greater habitual tendency of laughing at oneself compared to their low trait cheerful counterparts (Hofmann, 2018; Ruch & Proyer, 2008). Trait cheerful individuals were also more likely to stay in a cheerful mood when writing negative content (Ruch & Hofmann, 2012). Moreover, these dispositions may predict engagement in humor. Bruntsch & Ruch (2017) reported that individuals high in cheerfulness and low in bad mood more readily detect irony. Indeed, prevalence of cheerful mood and lower threshold for smiling and laughter may allow individuals to cope better under adversity (López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2018; Papousek & Schuler, 2010; Zweyer, Velker, & Ruch, 2004).

In its relations to humor, seriousness and bad mood were associated with gelotophobia and less socially warm humor styles (Ruch, Beermann, & Proyer, 2009; Ruch, Proyer, Esser, & Mitrache, 2011). Indeed, depressed patients showed lower cheerfulness, higher seriousness, and higher bad mood compared to healthy control counterparts, suggesting the role of these traits in affecting the threshold of experiencing amusement (Falkenberg, Jarmuzek, Bartels, & Wild, 2011). In terms of test-criterion

validity, the STCI accounted for about half of the variance in sense of humor, humor orientation, and humor creation measures (Wrench & McCroskey, 2001). Recent evidence also confirmed cheerfulness and seriousness accounted for the variance of humor behaviours above and beyond broad personality traits (Wagner & Ruch, 2020).

In terms of physical health, high trait cheerful individuals also benefit from better physical health and less psychosomatic disturbances (e.g., headache, tonicity, cardiac and circulatory troubles; Martin, 2001; Ruch et al., 1996; Ruch, 2008). Interestingly, higher state cheerfulness was found to be associated with lower values of disease activity and C-reactive protein in patients with ankylosing spondylitis and rheumatoid arthritis (Delgado-Dominguez, Font-Ugalde, Ruiz-Vilchez, Carretero-Dios, & Collantes-Estevez, 2014; Delgado-Domingue et al., 2016).

1.6. Cultural Differences in State-Trait Cheerfulness Inventory

Few studies have published findings regarding the STCI and its association with well-being in different cultures. Carretero-Dios and colleagues (2014) found that the trait version of the STCI in Spanish showed substantive overlaps with major personality dimensions, including cheerfulness with extraversion, seriousness with conscientiousness, and bad mood with neuroticism. Moreover, cheerfulness was positively associated with psychological well-being variables, including happiness, hope, and life satisfaction. Seriousness and bad mood were negatively associated with happiness and these traits were positively associated with anxiety and depression. No studies in the literature have conducted cross-cultural examination on translated versions of the STCI with its original German and English versions.

Research on other areas of positive and negative affect and humor may shed light to understand how positive affect and humor traits may differ across cultures. Individualist cultures tend to promote positivity whereas dialectical cultures value balance of emotions (Tsai, Knutson, & Fung, 2006). As well, previous findings showed European Americans had better recall of positive affect but not negative affect, whereas Asian Americans equally recalled positive and negative affect (Wirtz, Chiu, Diener, & Oishi, 2009). Perhaps individuals of East Asian descent tend to endorse more contradictory elements in opposing emotions compared to European White North Americans who have not been exposed to dialecticism (Goetz, Spencer-Rodgers, & Peng, 2008; Spencer-Rodgers, Peng, & Wang, 2010). Hence, the extent to which cheerfulness and bad mood are endorsed as opposing elements may be less prominent in collectivistic cultures.

Research on humor styles across cultures also showed significant differences between groups. For instance, North American participants displayed positive mood when exposed to self-enhancing humorous comments, but mood states did not differ amongst Middle East Lebanese participants exposed to self-enhancing, affiliative, and self-defeating humorous comments (Kuiper et al., 2010). In Spain, Torres-Marin, Navarro-Carillo, & Carretero-Dios (2018) found that self-defeating humor was not associated with either negative or positive psychological well-being. In fact, a small but significant positive correlation emerged with self-defeating humor and happiness. This is in contrast with North America, where self-defeating humor is typically found to be negatively associated with well-being (Martin et al., 2003). Wang and colleagues (2017) reported that Chinese employees reported lower levels of humor than Australian

employees. Similarly, Wu and Chan (2013) also found Chinese participants reported less use of humor in coping with stress than did their Canadian counterparts. These results align with the initial psychometric validation study of the humor styles questionnaire (HSQ) and coping humor scale (CHS) in Chinese participants, which found significantly lower scores on the HSQ subscales and CHS, compared to Canadian participants (Chen & Martin, 2007). In fact, humor in the Chinese culture may serve specific functions that differ from individualist cultures (Cheung & Rensvold, 2002; Yue, 2017). For example, affiliative and self-enhancing humor were positively related to horizontal collectivism and saving other-face and aggressive and self-defeating humor were positively related to saving self-face (Chen, Watkins, & Martin, 2013). More research is needed to investigate cross-cultural differences across the findings in the state-trait model of cheerfulness and humor to examine whether certain findings in the literature are culture-dependent.

1.7. The Current Research

The overarching objective of this research was to address the aforementioned gaps in the literature regarding the state-trait model of cheerfulness. This manuscript-based dissertation introduces novel research findings that incrementally advances knowledge and understanding of the state-trait model of cheerfulness.

Broadly speaking, the first objective involved assessing reliability and validity of newly constructed measures of the STCI. Within the first objective, three sub-objectives were proposed to: (1a) construct new measures of the STCI and assess reliability (i.e., single-test and conditional) and structural validity of the new measures, (1b) determine test-criterion validity of new STCI instruments, and (1c) conduct cross-cultural comparisons of the STCI-T60. With regards to objective 1a, the following chapters

provided evidence for the reliability and validity of the newly developed: English trait short form (Chapter two), English state short form (Chapter three), Chinese trait version (Chapter four), and Italian trait version (Chapter five) of the STCI. Chapters two (Study One) and three (Study Two) first assessed the reliability and validity of the state-trait model of cheerfulness standard version in English, as well as the psychometric properties of the newly constructed short forms. Recent studies have stressed the importance of creating short forms for larger studies that may require multiple reassessments (Hofmann et al., 2018). To date, no validated short version of the trait or state versions of the STCI have been developed and psychometrically validated in the literature to promote more efficient assessment of these constructs. The standard versions of the trait and state versions of the STCI are too elaborate for some purposes. In large scale research studies, a smaller number of items can be used and specific facets within each factor may not be of interest. Increasing trait and state cheerfulness through humor training interventions and cheerfulness-enhancing practices have also been documented to be beneficial for emotional stimulation and depressed mood changes (e.g., Falkenberg, Buchkremer, Bartels, & Wild, 2011; Ruch, Hofmann, Rusch, & Stolz, 2018). Hence, the development of a short form could also be used for screening purposes (e.g., selecting specific participants for studies) and in applied contexts (e.g., interventions studies). In Chapters Three and Four, the Chinese and Italian versions were constructed, and psychometric properties were compared between these newly developed measures to the English version. These measures provide the foundation to incrementally advance knowledge and understanding of the measurement properties of the state-trait model of cheerfulness across cultures.

With regards to objective 1b to establish test-criterion and construct validity, Chapters Two to Five examined test-criterion validity with other self-report measures of humor and well-being. Although one of the five facets in cheerfulness acknowledges a more cheerful interactive style, few studies have examined whether individuals high in trait cheerfulness have a more cheerful interaction style beyond self-report compared with their less cheerful counterparts (Ruch et al., 1996). Studies One and Two address this limitation through examining paragraphs written by participants and evaluating the choice of words (Study One and Two) and self-rater agreement (Study One) as it applies to cheerfulness, seriousness, and bad mood.

With regards to objective 1c, the STCI has been translated to over 10 languages (Hofmann et al., 2018; Ruch & Hofmann, 2017; Ruch, Hofmann, Rusch, & Stolz, 2018). Yet, cross-cultural examination of the measure in peer-reviewed literature is limited. For example, Carretero-Dios constructed a Spanish version of the STCI but items were not a direct translation from the original German or English versions, leading to difficulties with cross-cultural comparisons. The Chilean-Spanish and Chinese versions of the STCI trait form have been constructed with evidence of a three-factor structure (Chen, Ruch, & Li, 2017; Tapia-Villanueva, Armijo, Pereira, & Molina, 2014). However, these measures were not administered with other test-criterion validity measures (i.e., other than satisfaction with life) or compared to original German and English measures of the STCI. As such, Studies Three and Four address this limitation through investigating measurement invariance using multigroup confirmatory factor analysis (i.e., Italian version compared with English, Chinese version compared with English).

While the association between the state-trait model of cheerfulness with well-being has been documented in the literature, it has traditionally lent itself readily to zero-order correlational research. To address this limitation, analysis of individual differences (e.g., network analysis, moderation, mediation, self-other agreement) may further clarify the association between traits cheerfulness, seriousness, and bad mood with humor and well-being. Study Five aims to apply a network analysis approach to investigate (1) the structure and functioning of the STCI and humor traits as a network through a comprehensive, data-driven approach and (2) the interplay of facet-to-facet interactions across humor traits and the STCI. While numerous studies reported bivariate correlations between the STCI and a variety of humor-related traits (e.g., humor styles, comic style markers), it remains unclear the degree to which specific traits interact in the dynamic system. Thus, it becomes imperative to explore the trait-by-trait interactions across the temperament basis of humor and humor traits. Study Six investigated the mediating role of self-esteem and behavioural activation in cheerfulness and satisfaction with life. Study Seven explored the integrative role of cheerfulness and seriousness on resiliency and satisfaction with life. Study Eight provided evidence for the STCI and its associations with creativity (self-report, other-report) and well-being. Overall, this manuscript-based dissertation examines evidence regarding measurement properties of the STCI and its associations with humor and well-being to enhance knowledge and understanding of the state-trait model of cheerfulness.

CHAPTER 2: Study One

Title: Development and Linguistic Cue Analysis of the State Trait Cheerfulness Inventory (STCI) Trait Version Short Form¹

2.1. Introduction

Humor as a psychological trait is described as the cognition, behaviour, and affect that constitute amusement, mirth, and exhilaration experienced by an individual and expressed to their surrounding environment (Ruch, Köhler & van Thriel, 1996, 1997; Ruch, 1997). With respect to personality, Ruch et al. (1996) proposed the state-trait model of exhilaration, which includes three states and traits of cheerfulness, seriousness, and bad mood, to account for inter- and intra-individual differences in frequency, intensity, and duration of smiling and laughter (Ruch et al., 1996, 1997). The multidimensional aspect of this model considers the temperamental basis of the sense of humor to be a combination of high cheerfulness, low seriousness, and low bad mood that would contribute to exhilaration (Carretero-Dios, Benítez, Delgado-Rico, Ruch, & López-Benítez, 2014; Ruch et al., 1996). Specifically, the theoretical conceptualization of the model postulates that cheerfulness plays a prominent role in the tendency to engage in humor-related activities and lowers the threshold for exhilaration. Indeed, trait cheerfulness led to greater frequency, intensity, and duration of Duchenne smiling displays when interacting with a joking experimenter (Ruch, 1997). Two additional traits of seriousness, as a cognitive facet, and bad mood, as an affective component, increases the threshold for exhilaration, such that an individual in a serious frame of mind and/or in

¹ A version of this chapter has been published. Lau, C., Chiesi, F., Hofmann, J., Ruch, W., & Saklofske, D.H. (2020). Development and linguistic cue analysis of the state-trait cheerfulness inventory – short form. Advance online publication in *Journal of Personality Assessment*.

a bad mood would likely not engage in laughter, exhilaration, and humor-related activities (Ruch et al., 1996).

The State-Trait Cheerfulness Inventory - Trait Version (STCI-T; Ruch et al., 1996) was developed to measure the three traits of cheerfulness, seriousness, and bad mood. The proposed three-factor structure demonstrated replicability and generalizability across different language versions (Hofmann, Carretero-Dios, & Carrell, 2018; Ruch & Hofmann, 2012). Hofmann, Carretero-Dios, and Carrell (2018) tested six models using structural equation modeling and deemed the three-factor model with second loadings for some facets the best fit. As conceptually similar affective traits on opposing spectrums, cheerfulness and bad mood tend to have a negative correlation, while different versions show differential associations between seriousness and cheerfulness (Carretero-Dios et al., 2014). Ruch and Hofmann (2012) proposed abundant evidence that the homologous states and traits are conceptually separable, such that correlations between the traits were lower comparatively to the three states (for an overview, see Ruch and Hofmann, 2012). Overall, the STCI-T has shown strong psychometric properties and a replicable three-factor structure across multiple versions (Ruch & Hofmann, 2012).

Ruch and colleagues (1996) defined the construct of cheerfulness as a high prevalence of cheerful mood, the tendency to laugh easily and frequently, a cheerful interaction style, and a composed view of adverse life circumstances. These tendencies allow amusement to be facilitated but simultaneously, individuals who are serious and/or in a bad mood will be less inclined to express positive affect or smile at a stimulus that can be perceived as humorous (Ruch et al., 1996). The model accounts for general tendencies (i.e., traits) as well as present state, with state cheerfulness denoting positive

affectivity related to feeling merry and in good spirits and readiness to engage in humor-related activities at the present moment (Ruch et al., 1997). Similarly, state seriousness represents a serious frame of mind and the readiness to think and communicate seriously. Lastly, state bad mood is characterized by sad mood or ill-humoured mindsets, which mitigates the preference or ability to engage in humor (Ruch et al., 1997). Evidence suggests these states show more modest test-retest reliabilities compared to their trait counterparts (Ruch et al., 1996, 1997). Indeed, state measures from the STCI amalgamated showed stronger correlations with the respective traits than single state measures, further validating the importance of measuring distinct traits and states (Carretero-Dios, Eid, & Ruch, 2011).

Individuals with high trait cheerfulness exhibit a robustness in state cheerfulness and experience a cheerful composure and carefree frame of mind that allow these individuals to cope better in the face of adversity (Papousek & Schulter, 2010). Several empirical studies have found supporting evidence for this claim. First, trait cheerful individuals described more humorous behaviours that may act as protective factors, such as decreased fear of being laughed at by others and the tendency of laughing at oneself (Hofmann, 2018; Ruch & Proyer, 2008). For instance, trait cheerfulness predicted greater cheerful mood when shown funny and distorted photographs of oneself (Beermann & Ruch, 2011). A subsequent study that replicated this finding found that trait cheerfulness shows a large overlap with the ability to laugh at oneself, which subsequently predicts positive or negative reactions to the photographs presented (Ruch & Hofmann, 2012; Hofmann 2018). Moreover, the tendency to laugh at oneself under these circumstances

predicted greater intensity in Duchenne smiling when shown distorted pictures of oneself (Hofmann, 2018).

High trait cheerful individuals may experience greater benefits from experiencing genuine smiling and laughter. Trait cheerfulness predicted more Duchenne displays with a clowning experimenter, bloopers, and distorted photos of the self (Beerman & Ruch, 2011; Ruch 1997; Ruch & Hofmann 2012). These findings highlight the relationship between trait cheerfulness and life satisfaction from experiencing physiological effects of laughter and demonstrated greater self-acceptance for individuals with greater self-esteem. Finally, high trait cheerfulness promotes sensitivity to the emotional environment and these individuals may experience better emotional management with greater permeability to the affective environment (López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2018). Lopez-Benitez and colleagues (2018) found that low trait cheerfulness individuals experienced greater heart rate deceleration after watching clips, especially those with amusing scenes and high emotional load, compared to their high trait cheerful counterparts. These results suggest that trait cheerfulness is not just associated with a positive attention bias, but also with emotional regulatory processes (Lopez-Benitez et al., 2018; Papousek & Schulter, 2010).

To date, no validated short version of the STCI-Trait version has been developed and psychometrically validated in the literature to promote more efficient assessment of these constructs. The STCI-T60 is too elaborate for some purposes. In large scale research studies, a smaller number of items can be used and specific facets within each factor may not be of interest. Moreover, the development of a short-form could also be used for screening purposes (e.g., selecting specific participants for studies) and in

applied contexts (e.g., interventions studies). Increasing trait and state cheerfulness through humor training interventions and cheerfulness-enhancing practices have also been documented to be beneficial for emotional stimulation and depressed mood changes (e.g., Falkenberg, Buchkremer, Bartels, & Wild, 2011; Ruch, Hofmann, Rusch, & Stolz, 2018). In fact, Falkenberg, Jarmuzek, Bartels, and Wild (2011) found depressed patients had higher seriousness and bad mood and lower cheerfulness compared to healthy control groups for both state and trait forms of the measure. For individuals who participate in humor training, life satisfaction increased when comparing intraindividual differences in pre- and post- intervention and humor training also increased cheerfulness and decreased seriousness (Ruch & Hofmann, 2017; Ruch et al., 2018). A shorter measure for regular interval assessment could further develop this area of research. The present study proposes two parts that (1) investigate the item response theory parameters of the STCI-T60 and develop a shorter reliable and valid brief version and (2) investigate its validity through its associations with criterion validity measures and language use in written text.

2.1.1. Study One Part One Objectives

In the first part of the study, the item-level and test information properties were examined to produce a short version of the STCI using half of the items (i.e., STCI-T30) through applying item response theory (IRT). IRT is a parametric statistical modeling procedure that provides item-level properties in relation to the individual's estimated latent trait (Embretson, 1996; Embretson & Reise, 2000). Through applying IRT, items that maximize measurement precision across different ranges of the latent trait continuum may be selected for an effective, precise, and non-redundant short-form. While the STCI includes both trait and state versions, only the trait version was examined in this study.

2.2. Methods

2.2.1. Participants and Procedure

Data were complete for 839 undergraduate students and 207 were deleted based on a failed attention check. The attention check included a one-item question that asked participants to select a particular response. The final sample consisted of undergraduate students ($N = 632$; 61.1% females) enrolled in a large university in Canada recruited to participate in the study online using Qualtrics, a web-based survey tool. Students' ages ranged from 16 to 36 years ($M = 19.10$, $SD = 1.88$). Participation in the study was voluntary and participants received a credit towards a psychology course. An additional sample of Amazon Mechanical Turk (MTurk) workers were recruited using the TurkPrime Services (Litman, Robinson, & Abberbock, 2016). Individuals were provided \$1.50 to participate. TurkPrime has a specific algorithm for fraud detection and maintains higher data quality from bots implemented into the system. A filter question was created as an attention check and a hit approval rate (i.e., rate that Requesters have approved HITs that Workers complete) was set to 90% to ensure that historically, workers produced high quality work and a high number of HITs was returned (Litman et al., 2016). A total of 601 out of 714 cases passed the attention check and an additional seven cases with missing values were deleted. Finally, a total of 594 participants' ages ranged from 18 to 87 years ($M = 39.20$, $SD = 12.78$; 62.6% female) were included in the analyses.

To provide evidence for the temporal stability of the measure, a separate sample of 170 participants were collected from a separate study and these participants were contacted through a reminder e-mail through TurkPrime services (Litman, Robinson, &

Abberbock, 2016). A total of 137 MTURK workers (55.8% female) between 22 to 73 years of age ($M = 40.35$, $SD = 11.69$) responded to the email at Time 2 to complete the STCI-T60 again in a four to five-week interval to determine test-retest reliability.

Following Meriac, Woehr, Gorman, and Thomas (2013), the two samples were combined ($N = 1227$) and randomly split into two sub-samples: (1) the short-form Construction Sample ($n = 632$; 61.9% female, range [17, 76] years of age; $M_{age} = 28.70$; $SD_{age} = 13.49$) and (2) the Replication Sample ($n = 594$; 62.2% females; range [16, 87] years old age; $M_{age} = 29.11$; $SD_{age} = 13.58$) to cross-validate the item response theory parameterization and test information functions of the dimensions. Given that the undergraduate population represents a young and well-educated subgroup and MTurk workers are older and more variable in age, the merge of two samples allowed the obtainment of a convenience sample that was more similar to each other. Both subsamples had similar demographic composition (i.e., age, gender) and did not have significantly different scores in the three dimensions of the STCI (i.e., cheerfulness, seriousness, or bad mood). The two samples also met sample size requirements for accurate parameter estimations (Tsutakawa & Johnson, 1990). The two subsamples' composition reflected the composition of the two original subsamples (i.e., 52% undergraduates, 48% MTurk workers).

2.2.2. State Trait Cheerfulness Inventory – Trait Version (STCI-T60)

The standard version of the STCI-T60 was designed to measure cheerfulness, seriousness, and bad mood (Ruch, Köhler, & van Thriel, 1996). The standard version is comprised of 60 items, with 20 items measuring each factor, and respondents utilized a four-point scale (1 = *strongly disagree*, 4 = *strongly agree*) to evaluate each item. Like

other measures of personality (e.g., HEXACO; Ashton & Lee, 2009), each factor has subcategories (i.e., theoretical facets) that together are representative of the global latent trait (Ruch et al., 1996). Ruch et al. (1996) documented each facet, the description of each facet, and example items in the original publication.

2.2.3. Overview of Analyses

The first sample (i.e., short-form construction sample) was used to generate a short version of the STCI-T60 using half the items while retaining structure, content, measurement accuracy, and reliability of the full-scale. Items for the short form were selected using both the rational-theoretical construction strategy described by Ruch et al. (1996) and an item response theory analytic approach. In detail, the aim was to ensure there were items representative of each theoretically-derived facet that provided a comprehensive coverage of the construct-related attitudes and behaviours in the theoretical model. IRT was also used to select the best performing items and to provide evidence that the short form demonstrates similar measurement performance compared to the original version. To retain test-level measurement estimation, the goal in item selection was to retain the test information function (TIF) in the short version that demonstrates similar measurement precision to the longer version (Hulin, Drasgow, & Parsons, 1983). Thus, the shape of the test information curve (TIC), which is the graphical representation of the TIF, was compared and differences in reliability across the latent trait continuum were also evaluated. A test information function of 10 or above generally demonstrated reliability of .90 derived in classical test theory (CTT; Cappelleri, Lundy & Hays, 2014). To ensure findings are replicable, the measurement properties of the short-form were tested again in the replication sample (i.e., second sample) following

the same steps in the first sample. All IRT analyses were conducted using IRTPRO 2.0. Logistic regression and effect sizes of DIF were assessed using the “lordif” package in R (Choi, Kamarck, & Mermelstein, 2011).

2.3. Results

2.3.1. Preliminary Analysis

Prior to fitting any IRT models, evaluation of the scree plots using principal axis factor analysis of eigenvalues in the short-form construction sample was suggestive of a dominant factor for each of the individual factors, with the first value explaining 47%, 25%, and 46% of variance in cheerfulness, seriousness, and bad mood, respectively. Assumptions of monotonicity were examined through evaluating rest-score functions using the Mokken library in R (Meijer, Tenderio, & Wanders, 2015; Van der Ark, 2012). No significant violations were found.

2.3.2. Full Version Examination

Once unidimensionality, absence of local dependence, and monotonicity were confirmed for each factor, the psychometric properties of the STCI subscales were evaluated through Samejima's graded response model (GRM; Samejima, 1969). The χ^2 LD statistic was computed to detect local dependence (LD) as a calculation of cross-tabulations of observed and expected frequencies which allows observations of excessive item covariation that the latent trait does not explain (Chen & Thissen, 1997). In the original cheerfulness subscale, none of the S- X^2 item level diagnostic statistics were significant (Orlando & Thissen, 2003). Absence of local independence was confirmed when evaluating all marginal fit (X^2), supporting evidence for a good fit. Gender differential item functioning (DIF) analyses in the GRM were conducted using the IRT

likelihood ratio (IRTLR) based on an iterative purification procedure (Thissen, Steinberg, & Wainer, 1988). Differences in log-likelihoods distributed as χ^2 were compared to evaluate uniform DIF (i.e., evaluating category threshold differences), and non-uniform DIF (i.e., evaluating discrimination differences). Bonferroni's corrections were applied for each subscale and chi-square values $<.005$ were considered significant.

In Samejima's graded response model, an item discrimination value (a) and three category threshold (b_i) function values were generated for each item. Higher discrimination parameter values reflect a better indicator of the latent trait and less noise in measurement, as the factor weight is greater than the residual standard deviation (Samejima, 1996). Baker and Kim (2004) proposed cut-off values of item discrimination (a) values to be as follows: ≤ 0.24 as very low, 0.25 to 0.64 as low, 0.65 to 1.34 as moderate, 1.35 to 1.69 as high, and ≥ 1.7 as very high. The threshold parameters (b_i) were scaled as a z -score ($M = 0$, $SD = 1$) and reflects amount of latent trait required for a 50% probability of endorsing the next response category. Item discrimination values for the cheerfulness subscale ranged from .90 to 3.33 and category threshold values ranged from -3.96 and -1.76 in b_1 and .20 and 2.52 in b_3 . The gender DIF analysis revealed that none of the 20 items showed differential functioning across male and female respondents, demonstrating that this factor is gender invariant. Similar item selection procedures were applied to the seriousness and bad mood factors, with measurement properties in the $S-X^2$ item level diagnostic statistics confirmed for both factors. In the IRT calibration, item discrimination values in the original seriousness subscale ranged from .58 to 1.70 and category threshold values ranged from -5.51 and -1.74 in b_1 and .65 and 5.49 in b_3 . The gender DIF analysis flagged two out of 20 items (i.e., items 20 and 39), which showed

uniform DIF between male and female respondents. In the bad mood subscale, the original full scale included discrimination parameters ranging from 1.16 to 3.25 and category thresholds range from -2.12 and $-.03$ on a z -score in the lowest category b_1 and 1.39 and 2.80 in the highest category b_3 . Two items (i.e., items 29 and 56) of 20 were flagged for gender DIF. Items flagged for gender DIF were not selected for inclusion in the short form.

2.3.3. Short Form Selection Procedure

Items were chosen based on evaluation of each individual item information function (IIF) graphically represented by the item information curve (IIC), in which the area above the IICs were individually examined (Bortolotti, Tezza, de Andrade, Bornia, & de Sousa Júnior, 2013; Reise & Waller, 2009). Moreover, items that had significant DIF were not considered for the short form. The final set of cheerfulness items included four items from CH1 (items 19, 32, 46, 50), two from CH2 (items 22, 30), one from CH3 (items 14), one from CH4 (item 16), and two from CH5 (items 41, 59) to maintain the theoretical model of coverage across the subdomains. The final IRT analysis on this sample showed discrimination parameters in cheerfulness ranging from 1.34 to 3.68, which reflected strong values in discrimination (Baker & Kim, 2004). Threshold parameters in this sample ranged from -2.80 to -1.72 for b_1 and $.21$ to $.98$ for b_3 , indicating large coverage across the latent trait.

The same methodological framework was applied to obtain the short form in seriousness and bad mood. A total of 10 items were retained to maintain the theoretical model of coverage across the subdomains: SE1 (item 18), SE2 (items 28, 49), SE3 (items 12, 23, 47, 60), SE4 (items 42, 52), and SE5 (item 58). Similarly, the seriousness

subscale showed discrimination parameters ranging from .95 to 1.94, which reflected moderate to strong values in discrimination (Baker & Kim, 2004). Threshold parameters in this sample ranged from -3.95 to -1.89 for b_1 and .73 to 2.46 for b_3 . Upon elimination of low discrimination items in bad mood, the final IRT analysis for the bad mood subscale showed discrimination parameters ranging from 1.45 to 3.47, which reflected strong values in discrimination (Baker & Kim, 2004). Threshold parameters in this sample ranged from $-.69$ to $-.08$ for b_1 and 1.66 to 2.48 for b_3 , indicating more precise measurement at higher values of bad mood. Items were retained from each of the theoretical facets: BM1 (items 31, 34, 37), BM2 (items 13, 40, 54), BM3 (items 24, 48), and BM4 (items 11, 43). No items were flagged for gender DIF for any of the three subscales, which is suggestive of a gender invariant scale.

2.3.4. Short Form Evaluation

The final set of cheerfulness items included items from each facet that maintains the theoretical model of coverage across the subdomains. The final IRT analysis on this sample showed discrimination parameters in cheerfulness ranging from 1.34 to 3.68, which reflected strong values in discrimination (Baker & Kim, 2004). Threshold parameters in this sample ranged from -2.80 to -1.72 for b_1 and .21 to .98 for b_3 , indicating large coverage across the latent trait. The seriousness subscale showed discrimination parameters ranging from .95 to 1.94, which reflected moderate to strong values in discrimination (Baker & Kim, 2004). Threshold parameters in this sample ranged from -3.95 to -1.89 for b_1 and .73 to 2.46 for b_3 . Upon elimination of low discrimination items in bad mood, the final IRT analysis for the bad mood subscale showed discrimination parameters ranging from 1.45 to 3.47, which reflected strong

values in discrimination (Baker & Kim, 2004). Threshold parameters in this sample ranged from $-.69$ to $-.08$ for b_1 and 1.66 to 2.48 for b_3 , indicating more precise measurement at higher values of bad mood. Items were retained from each of the theoretical facets. No items were flagged for gender DIF for any of the three subscales, which is suggestive of a gender invariant scale. Detailed descriptions of IRT fit, discrimination and category threshold parameters, and gender DIF for the shortened STCI are provided in Table 1.

Table 1

Chi Square Fit Statistic, Item Discrimination, and Category Threshold Estimates with Standard Errors (in brackets), and Gender Differential Item Functioning (DIF) for the STCI-T30 trait version

Item	S- χ^2 (df)	p	a	b ₁	b ₂	b ₃	Gender DIF	
							a-DIF	b-DIF
Cheerfulness								
14. I can easily unwind and enjoy the moment.	65.16 (55)	.16	1.34 (.11)	-2.80 (.22)	-1.07 (.10)	.98 (.11)	0.0	9.6
16. Everyday life often gives me the occasion to laugh.	39.10 (43)	.64	1.88 (.14)	-2.77 (.20)	-1.46 (.10)	.35 (.07)	0.1	1.1
19. I have a “sunny” nature.	37.21 (37)	.46	3.00 (.21)	-1.82 (.10)	-.66 (.06)	.90 (.07)	3.1	0.8
22. I often smile.	44.82 (40)	.28	2.69 (.20)	-2.05 (.12)	-1.15 (.07)	.29 (.06)	1.1	5.1
30. I like to laugh and do it often.	34.88 (36)	.52	2.70 (.20)	-2.39 (.15)	-1.23 (.08)	.21 (.06)	0.0	4.4
32. I am a merry person.	30.29 (33)	.60	3.68 (.28)	-1.72 (.09)	-.57 (.05)	.91 (.07)	0.0	0.5
41. The good mood of others has a contagious effect on me.	51.74 (46)	.26	1.70 (.13)	-2.66 (.19)	-1.30 (.10)	.58 (.08)	0.0	6.5
46. I am often in a good mood, even without a specific reason.	33.73 (37)	.62	2.84 (.20)	-1.93 (.11)	-.67 (.06)	.96 (.07)	0.7	1.1

50. I am often in a joyous mood.	34.65 (34)	.44	3.64 (.28)	-1.82 (.10)	-.66 (.06)	.75 (.07)	0.1	3.0
59. It is easy for me to spread good cheer.	39.70 (38)	.40	2.78 (.20)	-1.91 (.11)	-.89 (.06)	.74 (.07)	0.8	1.3
Seriousness								
12. I plan my actions and make my decisions so that they are useful to me in the long run.	66.71 (38)	<.01 *	1.72 (.16)	-3.13 (.27)	-1.30 (.10)	.73 (.09)	0.4	1.7
18. In my life, I like to have everything correct.	49.51 (47)	.37	.95 (.10)	-3.95 (.43)	-1.49 (.17)	1.53 (.18)	0.3	1.6
23. In everything I do, I always consider every possible effect and compare all pros and cons carefully.	67.30 (45)	.02	1.53 (.13)	-2.63 (.21)	-.92 (.09)	1.00 (.10)	0.6	2.1
28. In most situations, I initially see the serious aspect.	51.22 (47)	.31	1.03 (.11)	-3.47 (.36)	-.62 (.10)	2.33 (.23)	3.9	2.6
42. I don't understand how others can waste their time on senseless matters.	82.31 (52)	<.01 *	1.00 (.10)	-1.89 (.19)	.19 (.10)	2.06 (.21)	1.5	4.3
47. I tend to plan far in advance and to set long-term goals for myself.	50.23 (42)	.18	1.94 (.17)	-2.12 (.15)	-.87 (.08)	.61 (.08)	0.1	4.2

49. Even seemingly trivial things have to be treated seriously and responsibly.	71.87 (51)	.03	1.05 (.11)	-2.10 (.20)	.22 (.09)	2.46 (.24)	0.1	1.3
52. try to spend my free time doing things as useful as possible.	38.24 (42)	.64	1.78 (.15)	-2.03 (.14)	-.60 (.07)	1.05 (.10)	0.4	0.4
58. When I communicate with other people, I always try to have an objective and sober exchange of ideas.	55.87 (52)	.33	.97 (.10)	-2.91 (.30)	-.74 (.11)	2.02 (.21)	0.0	8.2
60. One of my principles is: "first work, then play."	33.25 (46)	.92	1.54 (.14)	-2.12 (.16)	-.65 (.08)	1.03 (.10)	0.1	3.4
Bad Mood								
11. Compared to others, I really can be grumpy and grouchy.	63.33 (52)	.13	1.78 (.13)	-.60 (.08)	.89 (.08)	2.29 (.16)	1.8	1.9
13. I often feel despondent.	51.47 (48)	.34	2.11 (.15)	-.62 (.08)	.79 (.07)	2.03 (.13)	0.0	5.2
24. When friends try to cheer me up by joking or fooling around, I sometimes become more morose and grumpy.	67.69 (57)	.16	1.45 (.12)	-.57 (.09)	1.31 (.11)	2.48 (.19)	0.3	1.3
31. My mood is often not the best one.	23.32 (39)	.98	2.99 (.22)	-.68 (.07)	.64 (.06)	1.68 (.09)	0.0	5.1
34. Even if there is no reason, I often feel ill-humored.	48.47 (44)	.30	2.11 (.16)	-.69 (.08)	1.09 (.08)	2.36 (.16)	1.7	1.2
37. I am often in a bad mood.	36.25 (33)	.32	3.39 (.28)	-.14 (.06)	1.16 (.07)	2.27 (.13)	7.6	2.1

40. Sometimes I am distressed for a very long time.	55.21 (49)	.25	2.10 (.15)	-.66(.08)	.45 (.06)	1.66 (.10)	0.0	6.6
43. I am often sullen.	59.47 (40)	.02	2.77 (.20)	-.30 (.06)	1.03 (.07)	2.19 (.13)	1.3	3.1
48. I often feel so gloomy that nothing can make me laugh.	29.83 (42)	.92	2.64 (.20)	-.08 (.06)	1.12 (.07)	2.20 (.13)	2.2	2.7
54. I am a rather sad person.	45.01 (38)	.20	3.47 (.27)	-.05 (.06)	.94 (.06)	1.73 (.09)	2.4	0.3

Note. Number indicates item position in the paper-pencil parent form (STCI-T60). Fit was calculated under Samejima's Graded Response Model. Due to the large sample size α was fixed at .001 for $S-X^2$. a = item discrimination parameter, b = category threshold parameter. *indicates significance with Holm-Bonferroni corrections. A nonsignificant result (using the Holm-Bonferroni method) is an indicator of adequate model fit. Gender differential item functioning (DIF): tested using the likelihood ratio-based significance test under the IRT framework (IRT-LR) was not significant $p < .005$ for all tested items.

2.3.5. Replication of IRT Parameters

The replication of the IRT parameters for the short form was recalibrated in the replication sample to ensure similar measurement properties replicated. All items were fit under the graded unidimensional IRT model for each subscale, as suggested by the absence of local dependence (LD) evaluated with χ^2 LD suggestive of good fit for the unidimensional IRT modelling. In the cheerfulness subscale, discrimination parameters ranged from 1.74 to 4.25 and category difficulties ranged from -2.90 to -1.48 in b_1 and $.19$ to 1.02 in b_3 . In the seriousness subscale, the IRT calibration showed discrimination parameters ranging from $.77$ to 1.96 and category threshold ranged from -5.03 and -1.99 in b_1 and $.65$ and 2.79 in b_3 . In the bad mood subscale, the 10-item scale included discrimination parameters ranging from 1.45 to 3.47 and category thresholds ranging from $-.88$ and $-.02$ in b_1 and 1.45 and 2.83 in b_3 . One item was flagged for gender DIF, where uniform gender DIF emerged for item 11 in the bad mood subscale that did not appear in the construction sample. However, closer examination of the differential test function showed that the item-level DIF did not significantly impact the scale-level differential test functioning or the raw scale scores. Overall, evaluation of these values was similar to the construction sample, which demonstrated replicability of the initial findings. The item parameters and the item fit under the GRM model of the replication sample were reported in Table 2.

Table 2

Chi Square Fit Statistic, Item Discrimination, and Category Threshold Estimates with Standard Errors (in brackets), and Gender Differential Item Functioning (DIF) for the STCI-T30 Trait Version in the Replication Sample

Item	S- χ^2 (df)	<i>p</i>	<i>a</i>	<i>b</i> ₁	<i>b</i> ₂	<i>b</i> ₃	<i>Gender DIF</i>	
							<i>a</i> -DIF	<i>b</i> -DIF
Cheerfulness								
14. I can easily unwind and enjoy the moment.	52.42 (48)	.31	1.76 (.13)	-2.32 (.16)	-.93 (.08)	.84 (.09)	0.0	5.4
16. Everyday life often gives me the occasion to laugh.	46.33 (45)	.42	1.74 (.14)	-2.90 (.22)	-1.43 (.11)	.41 (.08)	0.2	2.7
19. I have a “sunny” nature.	33.57 (40)	.75	2.61 (.19)	-1.73 (.10)	-.64 (.06)	1.02 (.08)	1.3	0.7
22. I often smile.	53.05 (39)	.07	2.55 (.19)	-2.13 (.13)	-1.15 (.08)	.27 (.06)	4.2	2.0
30. I like to laugh and do it often.	56.41 (39)	.04	2.44 (.19)	-2.40 (.15)	-1.41 (.09)	.19 (.06)	0.0	0.4
32. I am a merry person.	62.38 (34)	<.01*	3.60 (.28)	-1.48 (.08)	-.48 (.06)	1.02 (.07)	0.5	1.7
41. The good mood of others has a contagious effect on me.	69.59 (47)	.02	1.82(.14)	-2.49 (.17)	-1.29 (.10)	.58 (.08)	0.0	2.6
46. I am often in a good mood, even without a specific reason.	52.67 (36)	.04	3.21 (.24)	-1.76 (.10)	-.57 (.06)	.98 (.08)	1.9	3.2
50. I am often in a joyous mood.	44.32 (31)	.05	4.25(.36)	-1.57 (.08)	-.57 (.05)	.86 (.07)	1.9	3.3

59. It is easy for me to spread good cheer.	43.16 (39)	.30	2.71 (.20)	-1.85 (.11)	-.85 (.07)	.77 (.07)	1.1	4.0
Seriousness								
12. I plan my actions and make my decisions so that they are useful to me in the long run.	27.92 (35)	.80	1.96 (.19)	-2.61 (.20)	-1.39 (.10)	.68 (.08)	1.9	13.9
18. In my life, I like to have everything correct.	72.44 (46)	.01	.80 (.10)	-5.03 (.67)	-1.81 (.23)	1.48 (.21)	1.7	1.5
23. In everything I do, I always consider every possible effect and compare all pros and cons carefully.	33.82 (39)	.71	1.71 (.16)	-2.63 (.21)	-.99 (.09)	.97 (.10)	2.3	3.0
28. In most situations, I initially see the serious aspect.	57.66 (48)	.16	1.03 (.11)	-3.14 (.33)	-.62 (.11)	2.14 (.23)	0.4	3.2
42. I don't understand how others can waste their time on senseless matters.	79.40 (52)	.01	0.77 (.10)	-2.03 (.26)	.58 (.14)	2.79 (.35)	0.0	2.6
47. I tend to plan far in advance and to set long-term goals for myself.	50.33 (40)	.12	1.68 (.16)	-2.15 (.17)	-.91 (.09)	.65 (.09)	1.0	2.9
49. Even seemingly trivial things have to be treated seriously and responsibly.	59.19 (47)	.11	1.07 (.11)	-1.99 (.20)	.04 (.09)	2.74 (.28)	0.0	10.9
52. try to spend my free time doing things as useful as possible.	48.05 (44)	.31	1.32 (.13)	-2.76 (.25)	-.68 (.09)	1.41 (.14)	1.3	6.3

58. When I communicate with other people, I always try to have an objective and sober exchange of ideas.	45.60 (49)	.61	.95 (.11)	-2.79 (.30)	-.53 (.11)	2.47 (.27)	1.1	2.6
60. One of my principles is: "first work, then play."	56.88 (43)	.08	1.51 (.14)	-2.38 (.19)	-.70 (.08)	1.04 (.11)	2.1	5.5
Bad Mood								
11. Compared to others, I really can be grumpy and grouchy.	55.01 (50)	.29	1.53 (.16)	-.73 (.12)	.76 (.11)	2.23 (.21)	1.9	13.9**
13. I often feel despondent.	77.45 (41)	<.01*	2.06 (.20)	-1.03 (.13)	.70 (.09)	1.91 (.15)	1.7	1.5
24. When friends try to cheer me up by joking or fooling around, I sometimes become more morose and grumpy.	53.04 (45)	.19	1.13 (.13)	-.73 (.15)	1.35 (.17)	3.26 (.38)	2.3	3.0
31. My mood is often not the best one.	36.22 (34)	.36	2.77 (.28)	-1.08 (.12)	.61 (.08)	1.68 (.12)	0.4	3.2
34. Even if there is no reason, I often feel ill-humored.	41.72 (42)	.48	1.70 (.17)	-1.06 (.14)	.96 (.11)	2.53 (.23)	0.0	2.6
37. I am often in a bad mood.	47.25 (30)	.02	2.97 (.32)	-.41 (.09)	1.01 (.08)	2.22 (.16)	1.0	2.9
40. Sometimes I am distressed for a very long time.	55.00 (44)	.12	1.80 (.18)	-1.17 (.14)	.03 (.09)	1.38 (.12)	0.0	10.9
43. I am often sullen.	39.61 (35)	.27	2.68 (.27)	-.64 (.10)	.91 (.08)	1.86 (.13)	1.3	6.3
48. I often feel so gloomy that nothing can make me laugh.	50.06 (38)	.09	2.21 (.23)	-.27 (.09)	1.02 (.09)	2.08 (.16)	1.1	2.6
54. I am a rather sad person.	38.45 (35)	.32	2.87 (.32)	-.16 (.09)	.88 (.08)	1.80 (.13)	2.1	5.5

Note. Number indicates item position in the paper-pencil parent form (STCI-T60). Fit was calculated under Samejima's Graded Response Model. a = item discrimination parameter, b = category threshold parameter. Gender differential item functioning (DIF): tested using the likelihood ratio-based significance test under the IRT framework (IRT-LR). *indicates significance with Holm-Bonferroni corrections. **indicates DIF for gender DIF. A nonsignificant result (using the Holm Bonferroni method) is an indicator of adequate model fit.

2.3.6. Reliability and Test Information Function

Evaluation of the TIFs between the full form and the short form showed similar measurement precision across the latent trait (i.e., θ). Close examination of the I's and associated standard errors of measurement (SEs) for 10-item STCI cheerfulness subscale demonstrated the greatest amount of information for respondents with -2.0 to +1.0 of cheerfulness respectively, as indicated by the maximum I and minimum SE (Figure 1 for the graphical representation of the TIF). Similarly, the TIF for seriousness showed informative assessment of θ from roughly -2.0 to +1.5. In terms of bad mood, the test information function indicated the greatest amount of information for -1.0 to +2.5 of θ , as evidenced by the maximum I and minimum SE. To quantify the change in reliability between the STCI original and the shortened version, the comparison was conducted across different levels of the latent trait through converting I to ω applying McDonald's (2013) formula [$= I/(I+1)$] (Table 3). The original and shortened scales' mean percent change of information in cheerfulness, seriousness, and bad mood were 4.61%, 4.44% and 6.26%, respectively, along the different trait level.

Table 3

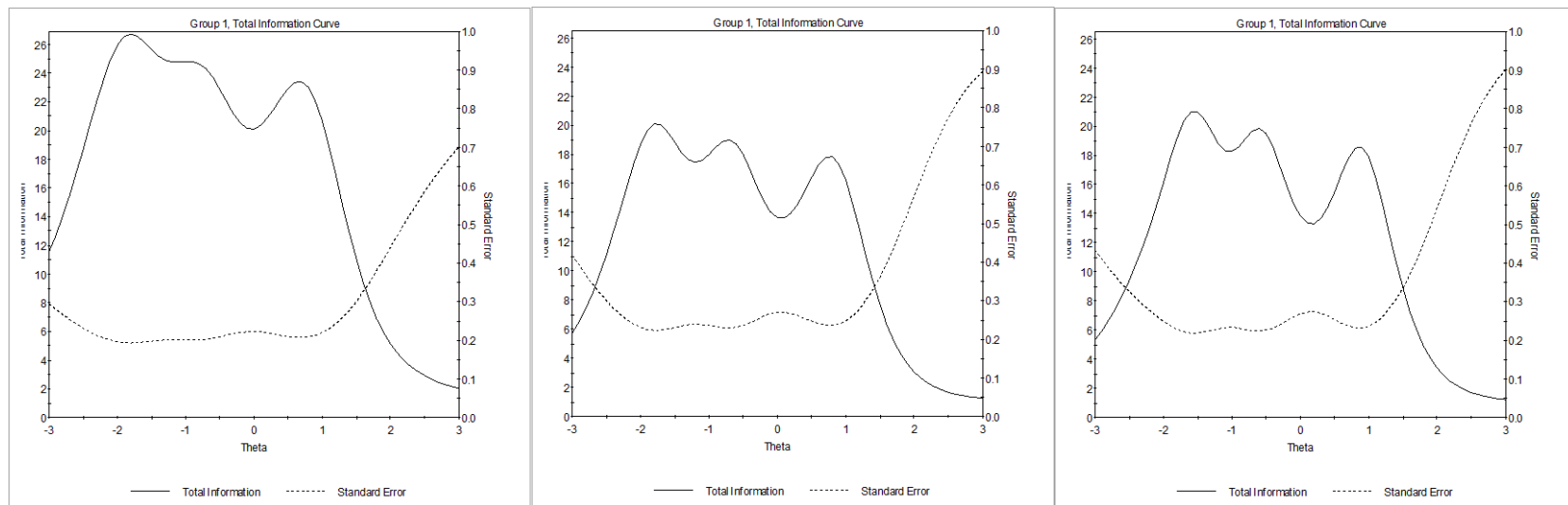
Reliability Omega Indices yielded over the Latent Trait Continuum

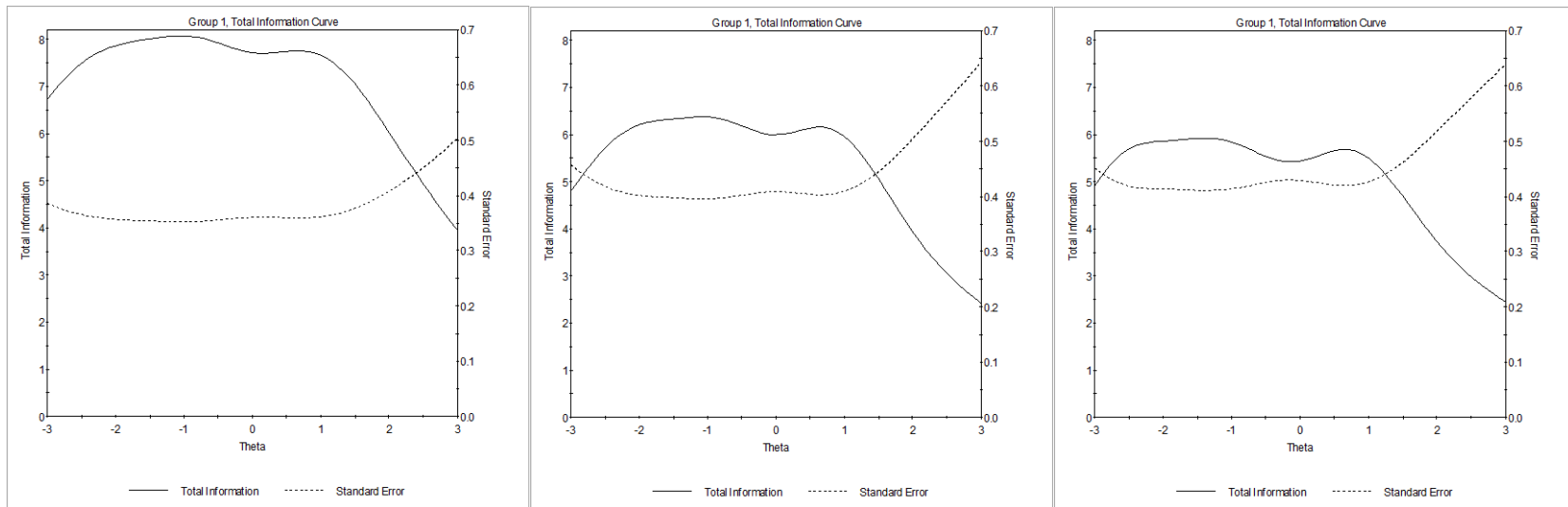
θ	<i>CHFS</i> (ω)	<i>CHSF</i> (ω)	% change	<i>SEFS</i> (ω)	<i>SESF</i> (ω)	% change	<i>BMFS</i> (ω)	<i>BMSF</i> (ω)	% change
-2.8	.93	.87	6.79	.88	.84	4.31	.73	.57	21.81
-2.4	.95	.91	4.20	.88	.85	3.36	.79	.63	20.50
-2	.96	.94	2.19	.89	.86	2.91	.85	.71	16.00
-1.6	.96	.95	.90	.89	.86	2.86	.89	.80	10.17
-1.2	.96	.95	1.21	.89	.86	2.85	.93	.88	5.52
-0.8	.96	.95	1.11	.89	.86	2.90	.95	.92	3.00
-0.4	.96	.95	.79	.89	.86	3.10	.96	.94	1.90
0	.95	.93	2.11	.89	.86	3.18	.96	.94	1.76
0.4	.96	.94	2.29	.89	.86	2.96	.96	.94	2.04
0.8	.96	.95	1.01	.89	.86	2.95	.96	.95	1.71
1.2	.94	.94	.82	.88	.85	3.64	.96	.95	1.54
1.6	.90	.88	2.72	.87	.83	5.08	.96	.95	1.62
2	.84	.77	7.66	.86	.80	6.99	.96	.94	1.53
2.4	.76	.66	13.76	.84	.76	8.95	.95	.93	1.73
2.8	.70	.58	17.17	.81	.73	10.54	.92	.89	3.07

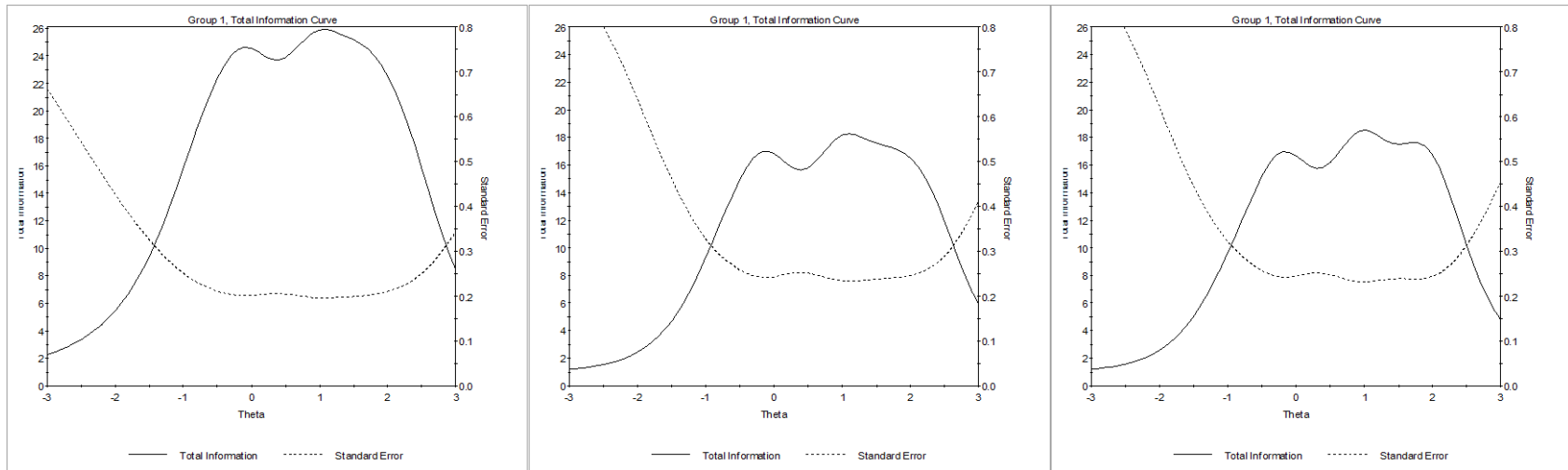
Note. CHFS=cheerfulness full scale. CHSF=cheerfulness short form. SEFS=seriousness full scale. SESF=seriousness short form. BMFS=bad mood full scale. BMSF= bad mood short form.

Figure 1

Test Information Function (TIF) for each subscale comparing the STCI-T60 and STCI-T30







Note. In the first row, cheerfulness measure displayed in STCI-T60 (left panel), STCI-T30 displayed in Construction Sample (middle panel), and STCI-T30 displayed in Replication Sample (right panel). In the second row, seriousness measure displayed in STCI-T60 (left panel), STCI-T30 displayed in Construction Sample (middle panel), and STCI-T30 displayed in Replication Sample (right panel). In the third row, bad mood measure displayed in STCI-T60 (left panel), STCI-T30 displayed in Construction Sample (middle panel), and STCI-T30 displayed in Replication Sample (right panel). Latent trait (γ) is shown on the horizontal axis, and the amount of information (solid line) and the standard error (dotted line) yielded by the test at any trait level are shown on the vertical axis.

2.3.7. Latent Trait Estimate Temporal Stability

Latent trait estimates were calculated for every participant at Time 1 and Time 2 using the expected a-posteriori estimation method in the program R: MIRT package (Chalmers, 2012). Pearson's correlation between latent trait estimates at Time 1 and 2 revealed that latent trait temporal stability was high for the short form: .89 for cheerfulness, .74 for seriousness, and .88 for bad mood. These results were similar to the long form, with strong test-retest latent trait estimates found: .89 in cheerfulness, .75 in seriousness, and .91 for bad mood, thus demonstrating strong test-retest reliability levels for all three traits comparable to the original version (Carretero-Dios et al., 2014; Ruch et al., 1996).

2.3.8. Dimensionality

Upon shortening the scale, a confirmatory factor analysis (CFA) was also conducted in the replication sample to ensure the original three-factor structure was retained (Byrne, 2001). The CFA was computed with the lavaan package (Rosseel, 2012) in R with the diagonally weighted least squares estimator (DiStefano & Morgan, 2014). The model fit were acceptable for the acquired indices in the three-factor model ($\chi^2/df[402] = 3.86$; RMSEA = .06, CFI = .95, TLI = .94, SRMR = .08) and demonstrated better fit than a two-factor (i.e., cheerfulness, seriousness/bad mood; $\chi^2/df[404] = 4.75$; RMSEA = .08, CFI = .93, TLI = .93, SRMR = .09) and unidimensional model ($\chi^2/df[405] = 5.55$; RMSEA = .09, CFI = .92, TLI = .91, SRMR = .10). All standardized factor loadings were statistically significant and of reasonable magnitude, ranging from .64 to .83 in cheerfulness, .35 to .64 in seriousness, and .55 to .84 in bad mood. Appendix B includes individual item statistics and model fit comparisons.

2.4. Discussion

The first part of the study showed items on the STCI-T60 demonstrated strong psychometric properties, as reflected on high discrimination parameters and well-distributed items across the latent continuum allowing differentiation across levels of the measured trait. Item characteristic curves for each individual item and the overall test information function demonstrated high discrimination parameters that were well spread across the latent continuum for all three latent traits respectively measured. A total of 10 items were selected for inclusion for (1) higher information conveyed compared to other items in its theoretical facet and (2) gender non-invariance. Reliability values, discrimination parameters, and category threshold parameters did not substantially deviate from the original version at different levels of cheerfulness, seriousness, and bad mood, which further promotes utility of the short version. The measurement precision of the test was evaluated using the Test Information Function (TIF), which, instead of providing a single reliability coefficient, showed the precision of the test across the latent trait continuum (Embretson, 1996; Embretson & Reise, 2000; Hambleton, Swaminathan, & Rogers, 1991). Results demonstrated that informative assessment was found in very low to high trait cheerfulness, very low to high trait seriousness, and low to very high trait bad mood. These results are consistent with other studies that showed measurements of positive psychological characteristics (e.g., optimism) to have a tendency towards being more precise at lower ends of the latent trait spectrum (Chiesi, Galli, Primi, Innocenti Borgi, & Bonacchi, 2013). Values of reliability were consistently high across the continuum for all three subscales and test-retest latent trait scores were high following the *European Federation of Psychologists Associations'* (EFPA) guidelines (Evers et al.,

2013). This analysis supported the original structure of this measure found across other studies (Ruch & Hofmann, 2012).

Upon exclusion of 10 items per subscale, the shortened scales demonstrated good reliability estimates from low to high levels of the trait, with the exception over extreme ends (above and below two standard deviations of the mean). Change in reliability at extreme ends has been noted in other studies with shortened scales, as items with low discrimination tend to have wider information functions but less measurement precision (Reise & Waller, 2009). Overall, reliability was high in both the long version and short version across the latent continuum and the short version did not substantially deviate from the original version at different levels of cheerfulness, seriousness, and bad mood.

2.5. Study One Part Two Criterion Validity and Textual Analysis

2.5.1. Objective of Part Two

The objective of the second part of the study was to examine (1) associations between STCI-T30 subscales and criterion validity measures, (2) associations between STCI-T30 subscales and specific linguistic categories utilized in written statements, and (3) the accuracy of personality judgments by judges based on this writing task. The judgement of the text by peers utilized the zero-acquaintanceship approach, with strangers (i.e., judges not familiar with any characteristics of the participants) rating cheerfulness, seriousness, and bad mood of each individual participant through a short writing task (Albright, Kenny, & Malloy, 1988). The text provided by participants also underwent an analysis of specific words and language use conveyed in the text by the participant as categorized by dimensions of the Linguistic Inquiry and Word Count (LIWC) software (Pennebaker et al., 2015).

2.6. Methods

2.6.1. Participants and Procedure

Participants consisted of university students ($N = 439$; 64.5% female) averaging 19.05 years of age ($SD = 1.78$ [range 16, 36]) that also participated in the first part of the study. In terms of proficiency in the language, English was the first language of 73.8% of the sample and 94% of the sample identified their English as proficient to very proficient. Participants were randomly selected and demographics and scores on the STCI did not differ than the sample reported in Part One.

2.6.2. Validity Measures

Playfulness. The Short Measure of Adult Playfulness (SMAP; Proyer, 2012) is comprised of five items assessing a unidimensional construct of adult playfulness, a construct defined as the habitual tendency to reframe everyday situations in a pleasurable, intellectually stimulating, and joyful manner (e.g., “I am a playful person”; Proyer, 2012). Respondents utilize a four-point scale (1 = *strongly disagree*, 4 = *strongly agree*) to evaluate each item. The initial validation study provided evidence for internal consistency, structural validity, and concurrent validity for the SMAP (Proyer, 2012; $\alpha = .82$).

Compassionate Love. The Compassionate Love Scale was designed to evaluate the degree to which participants feel compassionate or altruistic love towards strangers, selfless caring, and the motivation to help humanity (e.g., “When I see others feeling sad, I feel a need to reach out to them”; Sprecher & Fehr, 2005). Participants rated each item on a seven-point Likert-type scale (1=*not at all true of me*, 7=*very true of me*). This measure was added as a validity measure as previous research indicated that

compassionate love allows enhancement of positive mood from giving and receiving help (Sprecher & Fehr, 2006; $\alpha = .94$).

Self-Esteem. The Rosenberg Self-Esteem Scale (Rosenberg, 1965; Gray-Little, Williams, & Hancock, 1997) evaluates subjective emotional evaluation of an individual's own worth based on one's internal beliefs and self-concept (e.g., "I take a positive attitude toward myself"). Participants rated each item on a four-point Likert scale (1 = *strongly disagree*, 4 = *strongly agree*). Past research has established that this scale exhibited strong internal consistency and test-retest reliability, as well as structural, convergent, and discriminant validity (Gray-Little et al., 1997; Martín-Albo, Núñez, Navarro, & Grijalvo, 2007; $\alpha = .89$).

Satisfaction with Life. The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985; Lucas, Diener, & Suh, 1996) evaluates the cognitive aspects of subjective well-being using a seven-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). An example item includes "I am satisfied with my life." Previous findings showed the SWLS measure demonstrated strong internal consistency and structural validity (Pavot & Diener, 1993; $\alpha = .86$).

Writing Task. Each participant was instructed to write five to seven sentences for the question "please summarize some activities or events in the past week that come to your mind and how you felt doing them." The task was generated based on previous research findings using similar methodology that suggested specific instructions to increase homogeneity of the subject presented, while retaining heterogeneity in content (Proyer & Brauer, 2018). The texts had a mean length of 70.56 words ($SD = 38.48$; median = 71). Statements were then presented to judges with an anonymous ID code, and judges were

not provided any information about the individuals. After reading each statement, the judges completed three items analyzing the individual's cheerfulness, seriousness, and bad mood solely based on the writing task. More specifically, these three statements were provided on a four-point Likert-type scale (i.e., identical to that of the STCI: 1 = strongly disagree; 4 = strongly agree) and included: "this individual is a cheerful person," "this individual is a serious person," and "this individual is often in a bad mood." The sample of judges consisted of five Master's level research assistants ($M_{age} = 27.00$; $SD = 1.00$; 4 females) blind to the study hypotheses and whom rated 439 statements (i.e., one provided by each participant).

2.6.3. Analytic Approach for Criterion Variables

Bivariate correlations between the STCI-T60, STCI-T30, and all related variables were computed. Using Lee and Preacher's (2013) software, Steiger's (1980) z -tests were conducted to identify whether substantive differences between associations of short-form dimensions and long-form dimensions with criterion variables existed. Given that this test was conducted for each subset pair, Bonferroni correction was set to .004 (.05/12).

In terms of the writing task, the present study used a similar analysis scheme of Proyer and Brauer (2018), in which peer-ratings established convergent validity through Funder and West's (1993) measurement of accuracy of interpersonal perception. Self-other agreement (i.e., participant and judge agree with the trait) and consensus between judges (i.e., extent to which judges agree on trait) provided information to understand interpersonal processes associated with traits measured on the STCI.

The Linguistic Inquiry and Word Count (LIWC; Pennebaker, Boyd, Jordan, & Blackburn, 2015), a computerized text analysis software that allows the analysis of

specific linguistic features based on inputted text, was used to analyze the writing authored by the participants. The software includes an embedded dictionary in which words are categorized based on certain parts of speech (e.g., prepositions, pronouns), psychological processes (e.g., positive emotions, negative emotions), cognitive processes, social concerns, thematic content, and language composition elements. The software also provides four summary variables (e.g., clout, analytic thinking, authenticity, emotional tone) in which algorithms were developed based on several studies on language and social interaction (Pennebaker et al., 2015). For more information on these categories, Pennebaker et al., (2015) provide detailed descriptions of these categories. Each participant receives a standardized score converted to percentiles for the summary variables (Kacewicz, Pennebaker, Davis, Jeon, & Graesser, 2013). The reliability and validity of the LIWC analyses have been established in several studies (Pennebaker & King, 1999; Pennebaker, Mehl, & Niederhoffer, 2003; Tausczik & Pennebaker, 2010).

2.7. Results

2.7.1. Validity with Related Psychological Concepts

As expected, cheerfulness scores were positively associated with playfulness, compassionate love, self-esteem, and satisfaction with life scores, while bad mood scores showed negative associations with these constructs (Table 4). Seriousness scores were positively associated with self-esteem scores and did not show significant correlations with other criterion measures. Steiger's (1980) *z*-tests showed no significant differences when comparing the original and the abbreviated scales, except for the correlations with bad mood and self-esteem scores, with the short-form demonstrating weaker correlations.

Table 4

Means, Standard Deviations, Cronbach alphas, and Bivariate Correlates between the Trait form of the STCI-T30 and Related Psychological Concepts

Scales	<i>M</i>	<i>SD</i>	α	(1)	(2)	(3)	(4)	(5)	(6)	(7)
STCI-T										
(1) Cheerfulness	3.09	.54	.90	-	-.03	-.64*	.64*	.40*	.47*	.44*
(2) Seriousness	2.77	.46	.76	.03	-	.01	-.10	.03	.17*	.03
(3) Bad Mood	1.97	.57	.88	-.67*	-.04	-	-.37*	-.20*	-.65*	-.53*
Validity Measures										
(4) Playfulness	3.11	.58	.82	.62*	-.08	-.40*	-	-.29*	.30*	.28*
(5) Compassionate Love	4.87	.99	.94	.37*	.07	-.23*	.29*	-	.15*	.19*
(6) Self-Esteem	2.64	.56	.89	.44*	.17*	-.61*	.30*	.15*	-	.66*
(7) Satisfaction with Life	4.76	1.31	.86	.41*	.07	-.52*	.28*	.19*	.66*	-

Note. $N = 439$. * $p < .01$ (adjusted level of significance to adjust for Type 1 error). Below the diagonal= correlations between STCI-T30 variables and validity measures; Above the diagonal = correlations between STCI-T60 variables and validity measures.

Cronbach's α for T-30 listed. Cronbach's α for the STCI-T60 cheerfulness, seriousness, and bad mood subscales are .90, .76, and .88, respectively.

2.7.2. Judges Agreement

Intraclass Correlations (ICC) were used to evaluate inter-rater agreement between judges (Shrout & Fleiss, 1979). ICC values were .85 (95% CI: .82, .87), .72 (95% CI: .68, .76), and .83 (95% CI: .80, .85) for cheerfulness, seriousness, and bad mood respectively, demonstrating strong agreement amongst judges.

2.7.3. Writer-Judge Agreement

Bivariate correlations between the participant's total subscale scores on each STCI-T30 subscale and with the judges' scores were conducted. In terms of cheerfulness, participants' total score was positively associated with the judge's rating ($r[423] = .31, p < .001$), suggesting that, to some extent, judges were able to identify cheerful individuals based on the content provided, the style of writing, and choice of words. Similarly, in terms of bad mood, participants' total score on bad mood was associated with the judge's rating of bad mood ($r[415] = .36, p < .001$). Significant, yet weaker, bivariate correlations were found between self-report seriousness and judge-rated seriousness ($r[423] = .11, p < .05$).

2.7.4. Textual Analysis

Expression of cheerfulness, seriousness, and bad mood through language use was further analyzed using LIWC. Self-report trait cheerfulness was positively associated with more word use ($r[437] = .13, p < .01$) and clout ($r[437] = .11, p < .05$) indicating greater social status, confidence, or leadership conveyed in writing. Moreover, trait cheerfulness was positively associated with emotional tone ($r[437] = .17, p < .01$), indicating a more positive and upbeat tone in the choice of words. Contrary to the initial

hypothesis, trait cheerfulness was not associated with positive emotion, but was negatively associated with negative emotion ($r[437] = -.11, p < .05$).

Contrary to the initial hypothesis, trait seriousness was not associated with greater use of analytic words ($r[437] = .08, p > .05$). Trait bad mood was negatively associated with clout ($r[437] = -.18, p < .001$), suggesting less positive, upbeat writing style, and greater word use communicating anxiety, sadness, or hostility (Pennebaker et al., 2015). Consistent with the original hypothesis, bad mood was negatively associated with tone ($r[437] = -.28, p < .001$), negatively associated with positive emotion ($r[437] = -.14, p < .01$), and positively associated with negative emotion ($r[437] = .16, p < .01$). As expected, trait bad mood was positively associated with usage of words conveying anxiety ($r[437] = .11, p < .05$) and sadness ($r[437] = .15, p < .01$) while negatively associated with words conveying social processes (e.g., mate, talk, they; $r[437] = -.14, p < .01$).

2.8. Part Two Discussion

The second part of the study tested the associations with validity measures which further contributed to evidence of construct and criterion validity for the short-form measure. In terms of well-being, cheerfulness and bad mood showed associations with playfulness, compassionate love, self-esteem, and satisfaction with life in the expected directions and seriousness was positively associated with self-esteem. Seriousness was not significantly associated with any of the criterion variables, including playfulness, which showed that trait seriousness measured in the instrument was a quasi-trait as opposed to a bipolar trait (Reise & Waller, 2009). In other words, the absence of seriousness in a quasi-trait (e.g., serious vs. non-serious) does not indicate the presence of a playful disposition. Interestingly, seriousness was not associated with satisfaction with

life. Previous studies have found differential effects of seriousness depending on the version of the STCI used (Chen, Ruch, & Li, 2016). Future studies should investigate the associations between different traits combined with seriousness to produce differential outcomes in well-being (Proyer & Rodden, 2013).

The construct validity of the STCI-T30 was further demonstrated in the writing task in which participants described events and feelings in the past week. Expert judge ratings on textual information provided by participants converged amongst each other and also with the ratings that participants provided about themselves. These results align with a broad range of studies showing differential expressions of trait cheerfulness, including facial expressions with the Facial Action Coding System (FACS; Beermann and Ruch, 2011), facial signs of exhilaration and laughter (Ruch, 1997), and even differential activation of brain areas (Rapp et al., 2008).

Based on previous research with a similar methodology, correlations between self-rated STCI and LIWC variables were in a similar range (Proyer & Brauer, 2018). Results showed the vocabulary used by trait cheerfulness individuals included *clout*, which indicated greater social status, confidence, or leadership. Interestingly, trait cheerfulness was negatively associated with negative emotion but no associations were found with positive emotion. The first part of the study found that the scale appears to have better precision at lower ends of the spectrum (i.e., better at differentiating not cheerful and cheerful individuals than cheerful and extremely cheerful individuals). Perhaps individuals in the more extreme end of the distribution use more positive emotion words, but the scale was not able to capture these individuals. Similarly, trait bad mood, which theoretically consists of habitual emotional states of bad mood, sadness, and

ill-humoredness, was negatively associated with clout and positive emotion and positively associated with negative emotion. These results suggest a less positive and upbeat writing style and greater word use communicating anxiety, sadness, or hostility (Pennebaker et al., 2015). Moreover, words conveying anxiety and sadness and lack of words conveying social processes further implicate the distress element implicated in trait bad mood. Correlations are in the small range of effect sizes given that correlations with these writing categories tend to be small (Proyer & Brauer, 2018). Overall, the presence of distinctive language use in these writing samples allowed the examination of the predictive validity and practicality of the STCI.

2.9. General Discussion

The present research investigated (1) the reliability and validity of the newly developed STCI-T30 and (2) its validity through its associations with criterion validity measures and language use in written text. In sum, this study showed evidence for strong psychometric properties of the STCI-T30, as well as linguistic expressions and interactive styles associated with the measured constructs. The first part of the study assessed the reliability and validity of the English version of the STCI-T60 and newly developed STCI-T30. IRT parameters suggested good discrimination parameters across the latent continuum. Item characteristic curves for each individual item and the overall test information function demonstrated high discrimination parameters that are well spread across the latent continuum for all three latent traits respectively measured. The replication of the IRT parameters for the short form produced similar results in the replication sample. Overall, evaluation of these values was similar to the construction sample, which demonstrated replicability of the initial findings.

In terms of affect, high trait cheerful individuals showed greater facial signs of frequent and intense exhilaration when exposed to funny stimuli and greater fluctuations in state cheerfulness when exposed to stimuli related to positive or negative emotion in the expected directions (López-Benítez, Acosta, Lupianez, & Carretero-Dios, 2018; Ruch, 1997). This study further contributed to the literature in finding that specific linguistic cues were associated with cheerfulness and bad mood, and to a lesser extent, seriousness. Through reading a short paragraph, unacquainted judges' ratings were able, to some extent, converge with the participant's self-reported ratings of cheerfulness, serious, and bad mood. Given that cheerfulness and bad mood have both affective and cognitive components, it becomes apparent cheerfulness and bad mood were associated with behavioural cues that are interpersonal (e.g., cheerful or ill-humored interaction style) beyond facial expressions of smiling and laughter or lack thereof.

It is worth noting that the convergence of self-reported rating and judge-rating for seriousness was substantially lower than bad mood and cheerfulness. Moreover, trait seriousness was not associated with greater use of analytic words in the LIWC analysis. Perhaps this exercise focused on potential linguistic cues and indicators that were specifically affiliated with emotion, since participants were asked to describe events of the past week and also their feelings during this time. It is possible that trait seriousness may only be identified through exercises that require an attitudinal and habitual facet of a sober, pensive, and thoughtful frame of mind (Ruch et al., 1996). Future studies should examine whether a writing assignment that is task- or goal-oriented that may speak to specific facets of seriousness (e.g., planning ahead for an important task) or requires a

thoughtful frame of mind (e.g., pros and cons of a hypothetical situation) may acquire greater convergence between self- and judge evaluation of seriousness.

There are some limitations to the current study. First, this study sampled undergraduate university students and MTurk workers and the degree to which the results generalize to other diverse and heterogeneous samples is unknown. Future studies should compare differences in STCI scores when comparing participants of different race and socioeconomic status. Furthermore, with the STCI translated in over 10 languages and in different rating formats (e.g., self-report, peer-report), more studies are needed to provide support for the validity and utility for the short form in other versions (e.g., the short-form of the peer-rating version or different language adaptation). Second, the same set of participants participated in Part One and Part Two and future studies should replicate these findings in two separate samples. Third, the short form of the scale as a standalone instrument was not administered in this study and future studies should examine the reliability and validity of the STCI-T30 as a standalone instrument. Fourth, future studies could take into account state cheerfulness, state seriousness, and state bad mood in these different types of assessments across the time span in the writing task. For instance, it would be of interest to determine whether state measures are a better predictor than trait measures for momentary assessments in writing. Fifth, the short form has an unequal representation of items across facets of each of the subscales. This was especially the case for the cheerfulness subscale (i.e., CH1 was over-represented in the selection of items) and the seriousness subscale (i.e., SE3 was over-represented in the selection of items), which could change the way that the short form functions, relative to the original measure. However, the goal of the short-form was to establish maximal measurement

precision with the least amount of information loss in a smaller set of items. Studies that would benefit from greater detail in exploring functions of different facets of the STCI could opt to use the STCI-T106 or the STCI-T60. Sixth, in the present study, only a single attention check question was used to screen for invalid responders. It is unclear whether or not relying on one attention check item is a sound method for screening out invalid responders. Lastly, although both the subscales in the long and short form of the STCI showed adequate temporal stability, it did not necessarily imply that the STCI-T30 was provided with adequate temporal stability data if administered alone. Future studies should assess the temporal stability of the STCI-T30 when it is administered as a stand-alone measure.

Given its benefits on psychological and physical well-being, the measure can be used for future personality studies or experimental settings for a more economic assessment while still retaining reliability and validity for the heterogeneous constructs of cheerfulness, seriousness, and bad mood. With the rise of cheerfulness and humor-related interventions (see Ruch & Hofmann, 2017), the short form may be beneficial for administration for clients with limited concentration, while retaining reliability and validity of the original measure.

CHAPTER 3: Study Two

Title: Psychometric Validation and Investigation of Word Usage of the State Trait Cheerfulness Inventory (STCI) State Version Short Form²

3.1. Introduction

In conceptualizing the temperamental basis of the sense of humor, the state-trait model of exhilaratability (i.e., the disposition for laughter and exhilaration) describes the inter- and intraindividual differences for the inclination to experience humor-related cognition, behaviours, and affect (Ruch, Köhler, & van Thriel, 1997). Specifically, the state-trait cheerfulness inventory (STCI) measures cheerfulness and bad mood as affective-based mood states and seriousness as a dimension of frame of mind (Ruch & Hofmann, 2012; Ruch, Köhler, & van Thriel, 1996; Ruch et al., 1997). Ruch and colleagues (1996, 1997) generated both a trait form [State-Trait Cheerfulness Inventory-Trait Version (STCI-T); Ruch et al., 1996], representing stable personality characteristics, and a state form [State-Trait Cheerfulness Inventory-State Version (STCI-S); Ruch et al., 1997], representing variable changes based on situational and contextual factors. The state and trait models postulate that the combination of high cheerfulness, low seriousness, and low bad mood would allow exhilaration to occur and an individual to engage in humor (Hofmann, Carretero-Dios, & Carrell, 2018; Ruch et al., 1996). As defined by Ruch and colleagues (1996), cheerfulness is characterized by an affective component (i.e., cheerful mood), a behavioural component (i.e., a cheerful interaction style, the tendency to laugh easily and frequently), and a cognitive component (i.e.,

² A version of this chapter has been submitted and is currently under review for publication.

composed view of adverse life circumstances). This tendency enables individuals to get into a cheerful mood quickly and laugh in response to attempts at jocularity (Ruch, 1997; Ruch et al., 1996). For instance, an individual who is in a cheerful state of mind is more likely to engage in humor-related activities and to laugh at a joke than their less cheerful counterparts (Ruch et al., 1997). Experimental data demonstrated trait cheerfulness predicted greater frequency, intensity, and duration of Duchenne displays when interacting with a clowning experimenter (Ruch, 1997; Ruch & Hofmann, 2012). Concurrently, individuals who are serious or in a bad mood (i.e., ill-humored and/or sad) would be less inclined to express positive affect or smile at a stimulus that can be perceived as humorous (Ruch et al., 1996). Indeed, individuals who have a combination of high cheerfulness and low seriousness scored highly in fun-oriented playfulness compared to those with other combination traits (Proyer & Rodden, 2013).

Ruch and colleagues (1997) proposed that this model accounts for traits (i.e., stable over time and situations) that predict present states. The state aspect of this model represents impermanent mental states dependent on situational and contextual elements (López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2019; Ruch et al., 1997). Empirical evidence revealed the STCI states (i.e., cheerfulness, seriousness, bad mood) fluctuated and demonstrated sensitivity to mental and affective changes in imagined scenarios (López-Benítez et al., 2017) and in naturally occurring settings and experimentally-induced conditions (e.g., soccer fans before an easy win on TV, exposure to jokes and cartoons; Ruch et al., 1997). Ruch and Stevens (1995) reported that state cheerfulness was sensitive to individuals inhaling nitrous oxide (i.e., laughing gas) compared to

inhaling oxygen, and trait cheerfulness moderated this increase (Ruch & Hofmann, 2012).

Numerous studies have reported on the reliability and validity of the state-trait model of cheerfulness. Using a multitrait multi-method approach for sources of individual differences, state subscales of the STCI amalgamated showed stronger correlations with the respective traits than single state measures, further distinguishing distinct traits and states (Carretero-Dios, Eid, & Ruch, 2011). Specifically, high latent correlations across traits and aggregated states revealed strong convergent and discriminant validity (Carretero-Dios, Eid, & Ruch, 2011). Moreover, states demonstrated weaker test-retest reliabilities compared to their trait counterparts, thus distinguishing the stability of a trait and fluctuation of the state upon momentary assessment (Ruch et al., 1996; Ruch et al., 1997). López-Benítez and colleagues (2017) validated a three-dimensional model in the state version of the Spanish STCI and found strong measurement invariance between males and females. Test-criterion validity was also confirmed with state variables (e.g., anger, anxiety, positive affect) and items were sensitive to affective changes in the environment. Researchers replicated findings that traits were stable across the latent continuum model representing interindividual differences, while variations were well-addressed by states (López-Benítez et al., 2017).

Recent research has assessed state cheerfulness and its benefits to psychosocial and physical outcomes (Ruch & Hofmann, 2012). State cheerfulness predicted physical health outcomes, as higher state cheerfulness was associated with lower values of disease activity and C-reactive protein in patients with ankylosing spondylitis and rheumatoid arthritis (Delgado-Dominguez, Font-Ugalde, Ruiz-Vilchez, Carretero-Dios, & Collantes-

Estevez, 2014; Delgado- Dominguez et al., 2016). Increasing trait and state cheerfulness through humor training interventions and cheerfulness-enhancing practices have also been documented to be beneficial for emotional stimulation and depressed mood changes (Falkenberg, Buchkremer, Bartels, & Wild, 2011; Hirsch & Kranzhoff, 2004; Hirsch, Junglas, Konradt, & Jonitz, 2010; Konradt, Hirsch, Jonitz, & Junglas, 2013; Ruch, Hofmann, Rusch, & Stolz, 2018). Indeed, individuals with depression reported lower cheerfulness, higher seriousness, and higher bad mood compared to control participants (Falkenberg, Jarmuzek, Bartels, & Wild, 2011). Thus, state cheerfulness may be used as an indicator for positive mood state to decrease stress in humor training (e.g., Tagaliodou, Loderer, Distlberger, & Laireiter, 2018). The utility of the measure in capturing these important characteristics is fundamental across research settings and humor-related interventions (Ruch & Hofmann, 2017; Ruch, Hofmann, Rusch, & Stolz, 2018).

Given the utility of this instrument across research and clinical settings, the development of a short form of this measure could promote efficient assessment. While the Spanish and German versions have been validated, no study has evaluated the structural and concurrent validity of the English standard version of the STCI-S with 30 items (i.e., STCI-S30) and the short version with 18 items (i.e., STCI-S18). The short form could reduce participant fatigue during repeated assessments to evaluate pre- and post-intervention changes (Ruch, Hofmann, Rusch, & Stolz, 2018). Parts One and Two of Study Two aim to develop and assess the psychometric properties of the short form scale. Part three aims to assess the test-criterion validity through its associations with other self-report state measures and the scale's responsiveness to tone, affect, and emotions through writing samples.

3.2. Part One Methods

3.2.1. Participants

Undergraduate participants ($N= 933$; 68.2% female; $M_{\text{age}}= 18.44$; $SD_{\text{age}}=1.48$, range: [17, 36]) were recruited to participate in this study from the University of Western Ontario in Canada using Qualtrics, a web-based survey tool. In terms of country of birth, 609 were born in Canada (65.3%), 13 were born in the United States, and 309 were born outside of North America (e.g., China, Iran; 33.3%). In terms of ethnicity, 372 identified as European White (39.9%), 13 identified as Hispanic (1.4%), 28 identified as Black or African American (3.0%), five identified as Native American (0.5%), 367 identified as Asian/Pacific Islander (39.3%), 132 identified as other (14.1%; e.g., mixed race), and 18 preferred not to say or did not specify (1.7%). Participants were awarded credit towards their psychology course when signing up for the study and were debriefed upon the completion of the study. Ethical approval was received from the University of Western Ontario Non-Medical Research Ethics Board.

3.2.2. Instruments

State Trait Cheerfulness Inventory – State Version. The State Trait Cheerfulness Inventory – State Version (STCI-S30; Ruch et al., 1997) was designed to measure cheerfulness, seriousness, and bad mood as states. The standard version comprises of 30 items, with 10 items measuring each factor, and respondents utilized a four-point scale to evaluate each item (1 = *strongly disagree*, 4 = *strongly agree*). State cheerfulness measures two clusters of positive affectivities related to feeling merry (i.e., cheerfulness cluster) and readiness to laugh and engage in humor-related activities at the present moment (i.e., hilarity cluster; Ruch et al., 1997). State seriousness measures three clusters

of earnest, pensive, and sober states. This factor represents a serious frame of mind and the readiness to think and communicate seriously. State bad mood measures two clusters of sad and ill-humored mindsets, which mitigates the preference or ability to engage in humor (Ruch et al., 1997). Detailed descriptions of clusters are provided in Appendix C.

3.2.3. Procedure

The aim of Part One was to construct a short form with 18 items based on a rational-theoretical construction strategy. Dimensionality was assessed across several models to ensure the present data replicated the three-factor structure proposed by Ruch and colleagues (1997). Following recommendations of Schermelleh-Engel, Moosbrugger, and Müller (2003), the following fit indices were evaluated with these cut-off values: χ^2/df values of ≤ 2 and ≤ 3 as good and acceptable, respectively, comparative fit index (CFI) values of ≥ 0.97 and ≥ 0.95 as good and acceptable, respectively, root mean square error of approximation (RMSEA) values of ≤ 0.05 and ≤ 0.08 as good and acceptable, respectively, and standardized root mean square residual (SRMR) values of ≤ 0.05 and ≤ 0.10 as good and acceptable, respectively. The CFA models were computed using R: lavaan with maximum likelihood estimation (Rosseel, 2012).

Subsequently, items were calibrated using item response theory parameters and items were selected for the short form based on a rational-theoretical construction strategy described by Ruch et al. (1996). Using Samejima's (1969) graded response model, Baker and Kim (2004) suggested item discrimination (a) may be categorized as follows: $\leq .24$ as very low, $.25$ to $.64$ as low, $.65$ to 1.34 as moderate, 1.35 to 1.69 as high, and ≥ 1.7 as very high. The threshold parameters (b_i) were scaled with a z -score ($M = 0$, $SD = 1$), with the numerical value representing the z -score at which there is a 50%

probability of endorsing the next response category. Finally, reliability of the instrument was assessed using single-test reliability and conditional reliability estimates based on factor scores. Conditional Bayes expected a posteriori (EAP) estimation and Overall Reliability of fully-Informative prior Oblique N-EAP scores (ORION) reliabilities distribution and item response theory parameters were estimated on Factor version 10.10.03 (Ferrando, Navarro-Gonzalez, & Lorenzo-Seva, 2019).

3.3. Part One Results

3.3.1. Dimensionality

Closeness to unidimensional assessment of unidimensional congruence (UniCo = .72 [BCa 95% CI = .70, .73]), explained common variance (ECV = .78 [BCa 95% CI = .76, .80]), and mean of item residual absolute loading (MIREAL = .22, BCa 95% CI = [.21, .23]) suggested the data should not be treated as unidimensional (Ferrando & Lorenzo-Seva, 2018). A parallel analysis was conducted based on minimum rank factor analysis which advised a three-factor structure (Timmerman & Lorenzo-Seva, 2011).

Based on the recommendations of Hofmann, Ruch, and Carrell (2018), three different models were tested including: (1) a one-dimension model with all of the STCI-S items (Model 1), (2) a two-dimension model (Model 2) composed of humor dimensions (i.e., cheerfulness) versus “humorlessness” dimensions (i.e., seriousness and bad mood), and (3) a three-dimension model (Model 3) composed of the three correlated dimensions (i.e., cheerfulness, seriousness, and bad mood). Model 3 ($\chi^2/df=4.29$, CFI=.90, RMSEA=.06, SRMR=.08) demonstrated superior fit compared to Model 2 ($\chi^2/df=6.95$, CFI=.82, RMSEA=.08, SRMR=.09) and Model 1 ($\chi^2/df=10.12$, CFI=.72, RMSEA=.10, SRMR=.10). These results supported the structural validity of Model 3.

3.3.2. Assumptions Testing for Item Response Theory

Using item response theory (IRT) parameters, the association between individual differences on the individual states and the probability of endorsing a response was modelled (Embretson & Reise, 2000). The three states of cheerfulness, seriousness, and bad mood do not aggregate into a single construct indicator with between-item multidimensionality (Ruch et al., 1997; Ruch & Hofmann, 2012). Moreover, there is ongoing research to enhance the accuracy of parameters estimated by noncompensatory multidimensional IRT models (Chalmers & Flora, 2014). Under these circumstances, unidimensional models for IRT estimation were preferable.

Prior to IRT calibration, closeness to unidimensionality assessment was conducted for each of the factors. Moreover, Yen's Q_3 was computed to detect local dependence (LD) of any residual correlation of independent items (Christensen, Makransky, & Horton, 2017; Habing, Finch, & Roberts, 2005). No violations of LD (i.e., $>.30$ indicating high likelihood of LD) were detected in the cheerfulness or seriousness subscales but the bad mood subscale demonstrated violations in items four, 12, and 25. These items began with the wording "I am" or "I feel" and ended with the words "crabby" or "bad mood." As a result of method variance, correlated residuals were likely based on similar wording and content (Ziegler & Hagemann, 2015).

3.3.3. Item Response Theory Calibration

Closeness to unidimensionality assessments revealed that states cheerfulness, seriousness, and bad mood may each be regarded as unidimensional constructs separately (Ferrando & Lorenzo-Seva, 2018). Robust factor analyses were computed using diagonally weighted least squares estimation with bootstrap sampling (number of

bootstrap samples=500) and polychoric correlation matrices estimated with Bayes modal estimation (Choi, Kim, Chen & Dannels, 2011; DiStefano & Morgan, 2014). Factor loadings ranged from .60 to .86 in state cheerfulness, .39 to .75 in state seriousness, and .66 to .88 in state bad mood (Table 5). Samejima's (1969) Normal-Ogive model was utilized to estimate an item discrimination value (a) and category threshold values (b_i) for each item. The threshold values were well spread across the latent continuum, suggesting adequate measurement throughout low and high ends of the state.

Table 5

Closeness to Unidimensionality Assessment, Factor Loading, Item Discrimination and Category Threshold Estimates for the STCI-

S30

Item	I-UNICO	I-ECV	I-REAL	F [Bca CI]	<i>a</i>	<i>b</i> ₁	<i>b</i> ₂	<i>b</i> ₃
Cheerfulness Factor								
3. I felt chipper	1.00	.99	.03	.70 [.65, .76]	.98	-1.92	-.17	1.70
6. I was cheerful.	1.00	.99	.09	.86 [.81, .89]	1.66	-1.99	-.56	.88
8. I could laugh at the drop of a hat.	.99	.87	.24	.60 [.54, .65]	.75	-1.76	-.12	1.33
11. I felt merry.	1.00	.94	.22	.85 [.81, .88]	1.62	-1.73	-.24	1.26
16. I felt great.	1.00	.99	.11	.84 [.80, .88]	1.54	-1.79	-.49	.95
19. I was amused.	1.00	.80	.02	.78 [.73, .82]	1.25	-1.85	-.29	1.48
21. I saw the funny side of things.	.97	.80	.38	.74 [.69, .78]	1.11	-2.58	-.98	.77
23. I was walking on air.	1.00	.95	.14	.60 [.53, .66]	.75	-1.04	.78	2.70
26. I was delighted.	1.00	.95	.19	.84 [.79, .87]	1.56	-1.57	-.17	1.42

29. I was ready to have some fun.	.98	.82	.31	.64 [.57, .68]	.82	-2.60	-1.23	.46
Seriousness								
2. I was set for serious things.	1.00	.94	.20	.72 [.67, .77]	1.03	-1.95	-.73	1.20
5. I had important things on my mind.	1.00	.97	.11	.58 [.53, .65]	.71	-3.98	-2.45	-.01
7. I was in a thoughtful mood.	.44	.33	.72	.42 [.34, .50]	.46	-4.71	-2.45	1.19
10. I had a serious mental attitude.	.98	.82	.28	.59 [.53, .65]	.74	-1.41	-.10	1.83
13. I was in a pensive frame of mind.	1.00	.99	.05	.53 [.46, .60]	.63	-2.61	-.42	2.00
15. My thoughts were profound.	.97	.79	.25	.47 [.38, .53]	.53	-3.12	-.61	2.63
18. I was in a serious frame of mind.	.98	.83	.34	.75 [.68, .79]	1.13	-1.78	-.45	1.41
22. I regarded my situation objectively and soberly.	1.00	.98	.07	.52 [.44, .59]	.60	-3.38	-1.23	1.78
28. I was prepared to do a task in earnest	1.00	.95	.11	.44 [.36, .51]	.48	-3.70	-1.47	1.85
30. I was in a sober frame of mind	1.00	1.00	<.01	.39 [.31, .46]	.42	-4.26	-2.53	.40
Bad Mood								
1. I am in a bad mood.	1.00	.99	.10	.83 [.79, .86]	1.48	-.08	.97	2.15

4. I am sad.	.99	.86	.35	.85 [.82, .88]	1.63	-.16	.86	1.93
9. I feel grouchy.	1.00	.96	.17	.83 [.79, .86]	1.50	-.26	.88	2.08
12. I feel downhearted.	1.00	.92	.25	.83 [.78, .86]	1.50	-.52	.65	1.82
14. I am ill-humored.	1.00	.96	.13	.66 [.61, .71]	.88	-.43	1.41	2.97
17. My mood is spoiled.	1.00	.98	.12	.82 [.78, .85]	1.45	-.26	.92	2.03
20. I am peeved.	.99	.89	.25	.69 [.64, .73]	.95	-.55	1.03	2.59
24. I feel gloomy.	1.00	1.00	.01	.88 [.85, .91]	1.89	-.32	.63	1.87
25. I am in a crabby mood.	1.00	.91	.28	.88 [.85, .91]	1.88	-.17	.87	2.06
27. I feel dejected.	1.00	.96	.18	.84 [.80, .86]	1.52	-.30	1.00	2.20

Note. $N=933$. Number indicates item position in the paper-pencil parent form of the State-Trait Cheerfulness Inventory – State Standard Version (STCI-S30). F[Bca CI]=Factor loading with bias-corrected and accelerated bootstrap 95% confidence intervals for loading values. Fit was computed using Samejima’s Graded Response Model. a = item discrimination parameter, b = category threshold parameter. I-Unico=Item Unidimensional Congruence. ECV=Explained Common Variance. I-REAL=Item RESidual Absolute Loadings.

3.3.4. Construction of the STCI-S18

Analyses on the construction sample were conducted to generate a short version of the STCI-S30 using six of 10 items from each subscale while retaining reliability and structural validity of the full-scale. The rational-theoretical construction strategy was utilized to ensure representation of each theoretically-derived facet that provided a comprehensive coverage of the construct-related attitudes and behaviour in the theoretical model. Items were also selected based on the size of the a parameter and the spread of the b parameters (Bortolotti, Tezza, de Andrade, Bornia, & de Sousa Júnior, 2013). Upon elimination of low discrimination items from each theoretical facet, the STCI-S30 items were recalibrated to further examine measurement properties. Using the aforementioned estimation strategy, factor loadings ranged from .59 to .83 in state cheerfulness, .47 to .81 in state seriousness, and .68 to .90 in state bad mood. Item discrimination parameters ranged from .73 to 1.52 in state cheerfulness, .53 to 1.36 in state seriousness, and .94 to 2.07 in state bad mood. Upon shortening the scale, a confirmatory factor analysis (CFA) was conducted to ensure the original three-factor structure was retained (Byrne, 2001). Using maximum likelihood estimation, a CFA for the STCI-S18 demonstrated acceptable fit for a three-factor model ($\chi^2/df=3.84$, CFI=.94, RMSEA=.05, SRMR=.05). These results suggest the short form demonstrated strong structural validity (see Appendix D³).

3.3.5. Reliability

Single-test McDonald's ordinal ω revealed strong reliability in cheerfulness ($\omega=.93$), seriousness ($\omega=.80$), and bad mood ($\omega=.95$) for the STCI-S30 (i.e., 30-item

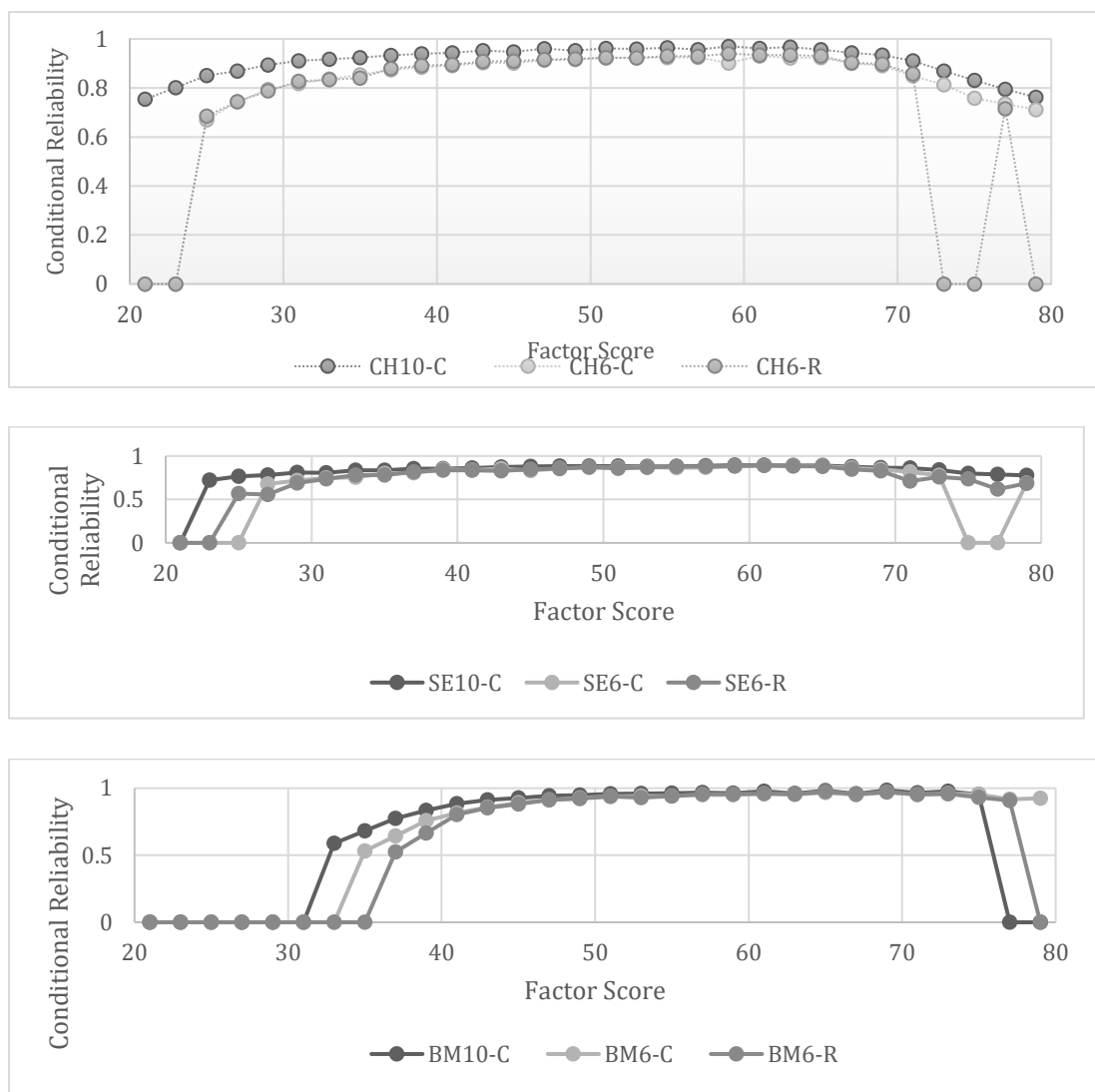
³ Appendix D provides closeness to unidimensionality assessment, factor loading, item discrimination, and category threshold estimates for the STCI-S18 state version in the construction sample.

measure). Similarly, the STCI-S18 (i.e., the short version) demonstrated acceptable reliability in cheerfulness ($\omega=.86$), seriousness ($\omega=.79$), and bad mood ($\omega=.93$).

Conditional reliability functions using EAP/ORION reliabilities distribution (number of nodes in graded model =20) were assessed comparing the STCI-S30 and the STCI-S18 (Ferrando, Navarro-Gonzalez, & Lorenzo-Seva, 2019). With the cut-off value of $\geq .80$ indicating strong reliability, all three subscales from the STCI-S30 and STCI-S18 showed similar measurement precision across the factor score spectrum (Figure 2; Ferrando et al., 2019).

Figure 2

*Conditional EAP/ORION Reliabilities Distributions along the Latent Continuum for
Cheerfulness, Seriousness, and Bad Mood*



Note. CH= Cheerfulness. SE= Seriousness. BM = Bad mood. Numbers represent number of items in the subscale with 10 representing standard version (STCI-S30) and 6 representing the short form (STCI-S18). “C” represents the construction sample in Part One and “R” represents the replication sample in Part Two.

3.4. Part Two

To ensure findings were replicable, the measurement properties of the short-form were tested in the replication sample (i.e., a second sample) to ensure similar IRT estimates replicated.

3.4.1. Participants

Undergraduate participants ($N= 617$; 63.9% female; $M_{\text{age}}= 18.82$, $SD_{\text{age}}=2.15$, range: [17, 38]) were recruited to participate via Qualtrics. The majority were born in Canada ($n=606$, 65.4%) and most identified as European White ($n=273$, 44.1%) and Asian/Pacific Islander ($n=240$, 38.6%).

3.4.2. Replication of IRT Parameters

Using maximum likelihood estimation, a CFA for the STCI-S18 demonstrated acceptable fit for a three-dimensional model ($\chi^2/ df=3.68$, CFI=.92, RMSEA=.07, SRMR=.08). The discrimination parameter estimates ranged from .72 to 1.62 for cheerfulness, .35 to 1.56 for seriousness, and 1.18 to 2.15 for bad mood. Discrimination parameters were acceptable (with the exception of one item in seriousness) and well-distributed across the latent continuum. The construct demonstrated strong single-test reliability in McDonald's ordinal ω (cheerfulness $\omega = .87$, seriousness $\omega = .77$, bad mood $\omega = .93$). Conditional EAP/ORION reliabilities distributions along the latent continuum were plotted in Figure 2. The item parameters and the item fit under the graded response model of the replication sample were summarized in Table 6. Results revealed the STCI-S18 is a reliable and structurally valid measure.

Table 6

Closeness to Unidimensionality Assessment, Factor Loading, Item Discrimination, and Category Threshold Estimates for the STCI-S18 State Version in Replication Sample

Item	I-UNICO	I-ECV	I-REAL	F[Bca CI]	a	b₁	b₂	b₃
Cheerfulness								
6. I am cheerful	1.00	.96	.18	.85 [.80, .89]	1.58	-2.11	-.62	.85
8. I could laugh at the drop of a hat.	1.00	.97	.10	.59 [.51, .64]	.73	-1.97	-.05	1.42
19. I am amused.	1.00	.99	.06	.80 [.73, .85]	1.33	-1.87	-.26	1.39
23. I'm walking on air.	.92	.71	.44	.64 [.56, .71]	.83	-.99	.79	2.37
26. I am delighted.	1.00	1.00	<.01	.85 [.81, .89]	1.62	-1.59	-.20	1.32
29. I am ready to have some fun.	.99	.87	.23	.59 [.49, .65]	.72	-2.86	-1.36	.80
Seriousness								
2. I am set for serious things.	.89	.66	.58	.65 [.56, .72]	.84	-1.83	-.52	1.46
5. I have important things on my mind.	1.00	.99	.07	.58 [.49, .67]	.72	-3.35	-2.25	.10
10. I have a serious mental attitude.	1.00	.97	.12	.65 [.57, .72]	.86	-1.22	.09	1.80
13. I am in a pensive frame of mind.	.96	.78	.28	.53 [.43, .59]	.62	-2.46	-.36	2.08
18. I am in a serious frame of mind.	1.00	.94	.21	.84 [.76, .90]	1.56	-1.52	-.40	1.26
22. I regard my situation objectively and soberly.	.98	.82	.16	.33 [.24, .45]	.35	-5.00	-1.78	2.89
Bad Mood								
4. I am sad.	.96	.78	.47	.82 [.77, .86]	1.44	-.05	.99	1.98
9. I feel grouchy.	1.00	.96	.17	.83 [.78, .87]	1.51	-.17	.95	1.99

20. I am peeved.	1.00	.96	1.00	.76 [.71, .81]	1.18	-.33	1.26	2.49
24. I feel gloomy	1.00	1.00	1.00	.91 [.87, .93]	2.15	-.23	.73	1.78
25. I am in a crabby mood.	1.00	.95	1.00	.89 [.85, .92]	1.98	-.07	.93	1.90
27. I feel dejected	1.00	.99	.07	.81 [.77, .86]	1.40	-.30	1.11	2.00

Note. $N=617$. Number indicates item position in the paper-pencil parent form of the State-Trait Cheerfulness Inventory – State

Standard Version (STCI-S30). F[Bca CI]=Factor loading with bias-corrected and accelerated bootstrap 95% confidence interval. Fit

was computed using Samejima's Graded Response Model. a = item discrimination parameter, b = category threshold parameter. I-

Unico=Item Unidimensional Congruence. ECV=Explained Common Variance. I-REAL=Item RESidual Absolute Loadings.

3.5. Part Three

3.5.1. Objective of Part Three

The aim of the third part of Study Two was to assess the test-criterion validity of the STCI-S18. First, the STCI-S18 was correlated with other state measures to assess convergent and discriminant validity. Second, participants were asked to report a retrospective event and fill out the STCI state version retrospectively. The aim was to provide evidence that the scale was sensitive to particular states the participant self-reported to be in. This methodology is consistent with procedures from other studies that asked participants to imagine or recall previous states (López-Benítez et al., 2019; Ruch et al., 1997).

Numerous studies demonstrated individual differences explored through linguistics revealed an individual's psychological characteristics (Brauer & Proyer, 2020; Hirsh & Peterson, 2009; Pennebaker, Mehl, & Niederhoffer, 2003). The present study randomized participants to write about one of three scenarios with the aim of investigating whether specific word categories (e.g., positive emotion, negative emotion) were associated with the degree to which they were in particular states.

3.5.2. Participants and Procedure

Undergraduate participants ($N=750$; 72.5% female; $M_{\text{age}}=18.60$, $SD_{\text{age}}=2.18$, range: [17, 45]) were recruited to participate in this study on Qualtrics. In terms of ethnicity, 256 identified as European White (34.1%), 13 identified as Hispanic/Latino (1.7%), 20 identified as Black or African American (2.7%), four identified as Native American (0.5%), 352 identified as Asian/Pacific Islander (46.9%), 93 identified as other (12.4%), and 12 preferred not to say or did not specify (1.6%). Participants completed the

STCI state version and other state measures at baseline. Upon completion of baseline questionnaires, they were randomized to one of three conditions to which participants were instructed to write about a time when they were in a (1) cheerful state, (2) serious state, or (3) bad mood state. After the writing task, participants completed the STCI state version regarding how they felt at the time of the reported event (i.e., retrospective reporting).

3.5.3. Instruments

State-Trait Cheerfulness Inventory – State Version Short Form (STCI-S18). The State Trait Cheerfulness Inventory – State Version was designed to measure cheerfulness, seriousness, and bad mood as states (Ruch, Köhler, & van Thiel, 1997). The short version comprises of 18 items, with six items per factor, and respondents utilized a four-point scale to evaluate each item (1 = *strongly disagree*, 4 = *strongly agree*). The current short version was extracted from the international version.

State Self-Esteem Scale (SSES). The SSES was designed to measure state self-esteem as three factors of performance, social, and appearance self-esteem states (Heatherton & Polivy, 1991). This measure evaluates subjective emotional evaluation of an individual's own worth based on one's internal beliefs and self-concept in these three areas (Heatherton & Polivy, 1991). Participants rated each item on a five-point Likert-type scale (1 = *not at all*, 5 = *extremely*). Past research has established that this scale exhibited strong internal consistency, as well as structural, convergent, and discriminant validity (Heatherton & Polivy, 1991).

Inspiration Scale. The Inspiration Scale measures the frequency and severity to which an individual feels inspired (Thrash & Elliot, 2003). Structural, convergent, and discriminant validity were established for this measure (Thrash & Elliot, 2003).

Maryland State Depression Scale (MSDS). The MSDS is a reliable and validated measure of global state depression. A modified version of the measure was administered in which items were positively keyed and utilized a five-point scale for current state (1=*not at all*, 5=*extremely*; Chiappelli, Nugent, Thangavelu, Searcy, & Hong, 2014). Structural, convergent, and known-groups validity were established for this measure (Chiappelli et al., 2014).

State Trait Anxiety Inventory – State Version (STAI). The short version of the STAI–state version was designed to evaluate the degree to which anxious feelings are experienced at the moment of assessment (Marteau & Bekker, 1992). Participants rated each item on a seven-point Likert-type scale (1=*not at all true of me*, 7=*very true of me*). Marteau and Bekker (1992) reported satisfactory reliability coefficients and convergent validity for the measure.

Writing Task. Participants were randomized to write about a specific scenario. Each participant was randomized to one of three writing conditions in which participants were instructed to write about a time when they were (1) cheerful, (2) serious, or (3) in a bad mood. As Proyer and Brauer (2018) suggested, writing task prompts should have specific instructions to encourage homogeneity of the theme, while retaining heterogeneity in content. Participants completed the STCI-state version prior to expressive writing (i.e., baseline) and also completed the STCI-state version to report how they felt at the time of the event (i.e., retrospectively). Participants were instructed to describe their situation and

be expressive with their feelings. Detailed descriptions of personal experiences that reflected on an individual's personality and identity were encouraged in this assessment (McAdams, 2001; McLean et al., 2007). Participants were instructed to write for approximately 10 minutes.

3.5.4. Data Analytic Strategy

Bayesian correlation tests with Pearson's r were conducted between the STCI-S18 and state measures and the STCI-S18 and Linguistic Inquiry and Word Count (LIWC) categories (Pennebaker, Boyd, Jordan, & Blackburn, 2015). Jeffreys's (1961) Bayes Factor described the observed data using a priori and posterior distribution, which allowed quantification of evidence in favor of the alternative and null hypothesis (Ly, Verhagen, & Wagenmakers, 2015). Jeffreys's (1961) Bayes Factors for evidence of alternative hypotheses can be interpreted with 1–3 as weak, 3–10 as substantial, 10–30 as strong, 30–100 as very strong, and >100 as decisive (Jarosz & Wiley, 2014). All tests were conducted under a default uniform prior using JASP 0.14 (JASP Team, 2020).

LIWC is a computerized text analysis software that identifies categories of linguistic features (Pennebaker et al., 2015). The reliability and validity of LIWC categories have been investigated in several studies (Pennebaker & King, 1999; Pennebaker, Mehl, & Niederhoffer, 2003; Tausczik & Pennebaker, 2010). Certain parts of speech (e.g., prepositions, pronouns), psychological processes (e.g., positive emotions, negative emotions), cognitive processes, social concerns, thematic content, and language composition may be identified using this software (Pennebaker et al., 2015). The LIWC2015 software also provides summary variables (e.g., clout, analytic thinking, authenticity, emotional tone) based on algorithms developed that quantifies percentage of

words used in the text compared with a dictionary of words in categories and sub-dictionaries (Pennebaker et al., 2015).

Based on findings in Study One, it is hypothesized that retrospective state cheerfulness will positively associate with clout, tone, and less negative emotion. It is also hypothesized that retrospective seriousness is associated with analytic thinking and insight while retrospective bad mood is negatively associated with tone and positive emotion and positively associated with negative emotion. States reported at baseline should not be associated with LIWC variables, demonstrating the validity for momentary assessments. The average time participants took was 9.11 minutes for the writing task.

3.6. Results

3.6.1. Validity with Related Psychological Concepts

Table 7 shows the computed Bayesian correlations with Pearson's r between the STCI-S and positive and negative indicators of state variables. State cheerfulness showed negative associations with states seriousness ($r = -.15$, $BF_{10} > 100$) and bad mood ($r = -.51$, $BF_{10} > 100$) while seriousness and bad mood were positively correlated ($r = .17$, $BF_{10} > 100$). With validity measures, state cheerfulness was positively associated with inspiration (i.e., frequency [$r = .28$, $BF_{10} > 100$] and intensity [$r = .21$, $BF_{10} > 100$]) and state self-esteem (i.e., appearance [$r = .39$, $BF_{10} > 100$], performance [$r = .38$, $BF_{10} > 100$], social [$r = .33$, $BF_{10} > 100$]), while showing negatively correlations with state depression ($r = -.40$, $BF_{10} > 100$) and state anxiety ($r = -.50$, $BF_{10} > 100$). State bad mood showed negative associations with inspiration frequency ($r = -.24$, $BF_{10} > 100$), inspiration intensity ($r = -.16$, $BF_{10} > 100$), self-esteem (i.e., appearance [$r = -.42$, $BF_{10} > 100$], performance [$r = -.55$, $BF_{10} > 100$], social [$r = -.46$, $BF_{10} > 100$]), and positive associations

with states depression ($r = .67, BF_{10} > 100$) and anxiety ($r = .67, BF_{10} > 100$). State seriousness was positively correlated with inspiration intensity ($r = .17, BF_{10} > 100$) and state anxiety ($r = .18, BF_{10} > 100$), while negatively associated with social self-esteem ($r = -.15, BF_{10} > 100$).

Table 7

Means, Standard Deviations, McDonald's Omega Values, and Intercorrelations among the STCI-S and Self-Report State Measures

Validity	Mean (SD)	ω	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. Cheerfulness	2.62 (.54)	.87	—										
2. Seriousness	2.06 (.66)	.60	-.15**	—									
3. Bad Mood	2.90 (.43)	.87	-.51**	.17**	—								
4. Inspiration Frequency	4.25 (1.31)	.89	.28**	.11	-.24**	—							
5. Inspiration Intensity	4.29 (1.26)	.87	.21**	.17**	-.16**	.71**	—						
6. Depression	2.24 (.82)	.93	-.40**	.12	.67**	-.30**	-.20**	—					
7. Anxiety	2.26 (.69)	.84	-.50**	.18**	.67**	-.26**	-.20**	.58**	—				
8. Self Esteem	3.07 (.71)	.92	.42**	-.12*	-.55**	.30**	.22**	-.65**	-.59**	—			
9. Appearance Subscale	2.99 (.82)	.83	.39**	-.06	-.42**	.31**	.21**	-.52**	-.47**	.86**	—		
10. Performance Subscale	3.22 (.78)	.83	.38**	-.10	-.55**	.29**	.22**	-.60**	-.57**	.86**	.59**	—	
11. Social Subscale	2.99 (.84)	.85	.33**	-.15**	-.46**	.21**	.14**	-.58**	-.50**	.90**	.68**	.65**	—

Note. $N=750$. * $BF_{10} > 10$ ** $BF_{10} > 100$. ω =McDonald's omega. Average inter-item correlation for state seriousness was .19. and ω does not increase when dropping items.

3.6.2. Cheerful Writing Condition

The texts ($n=248$) had a mean length of 118.39 words ($SD=72.18$; median=99). Individuals wrote on a large variety of topics, including receiving an athletic scholarship, being asked out on a date, attending a party, receiving notice on the acceptance to university, going camping, and receiving recognition for an award. Bayesian paired sample t -tests (scale of the Cauchy prior distribution with default set as .707) demonstrated that participants reported higher retrospective ratings of state cheerfulness ($BF_{10} > 100$) and lower retrospective state bad mood ($BF_{10} > 100$) and state seriousness ($BF_{10} > 100$) compared to baseline ratings. These results provide evidence for the sensitivity of the scale in detecting state cheerfulness and fluctuations in states.

LIWC analyses revealed that retrospective state cheerfulness was positively associated with clout ($r = .23$, $BF_{10} > 30$) indicating a choice of words conveying greater social status, confidence, and leadership. Moreover, state cheerfulness was positively associated with emotional tone ($r = .42$, $BF_{10} > 100$), indicating a more positive and upbeat tone in the choice of words. Consistent with findings in Study One, cheerfulness was not associated with positive emotion, but showed negative correlations with negative emotion ($r = -.32$, $BF_{10} > 100$).

Retrospective state seriousness was negatively associated with clout ($r = -.23$, $BF_{10} > 30$), social processes ($r = -.25$, $BF_{10} > 100$), and words related to friends ($r = -.24$, $BF_{10} > 100$) and affiliations ($r = -.27$, $BF_{10} > 100$). State seriousness was positively associated with words related to insight ($r = .23$, $BF_{10} > 100$). Moreover, state seriousness was positively associated with words related to the power ($r = .31$, $BF_{10} > 100$), achieve ($r = .28$, $BF_{10} > 100$), and work ($r = .30$, $BF_{10} > 100$) categories.

Retrospective state bad mood was negatively correlated with emotional tone ($r = -.47$, $BF_{10} > 100$) while positively associated with negative emotion ($r = .33$, $BF_{10} > 100$) and sadness ($r = .28$, $BF_{10} = > 100$). There was substantial evidence retrospective state bad mood was associated with positive emotion ($r = -.18$, $BF_{10} = 3.93$). Aforementioned LIWC variables were not associated with states cheerfulness, seriousness, and bad mood at baseline.

3.6.3. Bad Mood Writing Condition

The texts ($n=249$) had a mean length of 129.10 words ($SD = 83.21$; median = 117). Bayesian paired sample t -tests with a default prior revealed state cheerfulness ($BF_{10} > 100$) reported retrospectively was significantly lower and state bad mood ($BF_{10} > 100$) and state seriousness ($BF_{10} > 10$) were significantly higher compared to assessment at baseline. These results provide evidence for the sensitivity of the scale in detecting state bad mood fluctuations. A variety of topics were identified, including achieving a poor grade in school, contemplating how the coronavirus affected one's life, being hospitalized for a suicide attempt, and missing family during the first week of university.

Contrary to initial hypotheses, states cheerfulness and bad mood were not associated with tone, clout, positive emotion, or negative emotion (all $BF_{10} < 1$). State cheerfulness was associated negatively with words focused on the past ($r = -.32$, $BF_{10} > 100$) and positively with words focused on the present ($r = .32$, $BF_{10} > 100$). In contrary, state bad mood was positively associated with words focused on the past ($r = .27$, $BF_{10} > 100$) while negatively associated with words focused on the present ($r = -.24$, $BF_{10} > 100$). State seriousness was not associated with LIWC variables. Aforementioned LIWC

variables were not associated with states cheerfulness, seriousness, and bad mood at baseline.

3.6.4. Seriousness Writing Condition

The texts ($n=246$) had a mean length of 111.10 words ($SD = 71.18$; median = 96). Bayesian paired sample t -tests indicated that state cheerfulness ($BF_{10} > 100$) reported retrospectively was significantly lower and states bad mood ($BF_{10} > 100$) and seriousness ($BF_{10} > 10$) were significantly higher compared to baseline. These results provide evidence for the sensitivity of the scale in detecting state seriousness. Respondents reported on a diversity of topics, including choosing which university to attend, playing in a sports competition, visiting an art museum, and listening to a friend regarding her mental health concerns. In this condition, state cheerfulness reported retrospectively was positively associated with emotional tone ($r=.53$, $BF_{10} > 100$) and positive emotion ($r=.37$, $BF_{10} > 100$), while negatively associated with negative emotion ($r = -.30$, $BF_{10} > 100$) and sad mood ($r = -.23$, $BF_{10} > 30$). State cheerfulness was not associated with clout ($r=.11$, $BF_{10}=.32$).

State seriousness was not associated with LIWC categories as initially hypothesized. State bad mood was negatively associated with tone ($r = -.47$, $BF_{10} > 100$) and positive emotion ($r = -.27$, $BF_{10} > 100$), while showing positive correlations with negative emotion ($r = .30$, $BF_{10} > 100$), sadness ($r=.26$, $BF_{10} > 100$), and anger ($r = .23$, $BF_{10} > 30$). Aforementioned LIWC variables were not associated with states cheerfulness, seriousness, and bad mood at baseline.

3.7. Discussion

The present research investigated (1) the reliability and validity of the newly developed STCI-S18 and (2) its validity through its associations with criterion validity measures and language use in written text. This first part of the study demonstrated evidence for strong psychometric properties of the STCI-S30 and the newly developed STCI-S18. IRT estimations showed good discrimination parameters well distributed across the latent continuum. EAP/ORION conditional reliability demonstrated that the short form showed strong reliability across the factor score continuum. Evaluation of these values were similar in the replication sample, which demonstrated replicability of the initial findings. Furthermore, test-criterion validity was established with other state-like variables. These results suggest the STCI-S18 demonstrated structural, convergent, and discriminant validity.

The present study supported Ruch and colleagues' (1996) theoretical model that the presence of a disposition facilitating positive affect and humor (i.e., cheerfulness) is expected to be at odds with humorlessness dimensions (i.e., seriousness, bad mood) in state forms. In the present study, individuals randomized to a cheerful writing scenario expressed higher cheerful state and lower seriousness and bad mood states compared to baseline. In contrast, individuals randomized to a serious or bad mood writing scenario reported higher states seriousness and bad mood and lower state cheerfulness. As such, there appears to be a dichotomy between experiencing a high cheerful and low "humorlessness" (i.e., depicted as high seriousness and high bad mood) state and a low cheerful and high "humorlessness" state (Ruch & Hofmann, 2012).

The present study further contributed to the literature in finding that specific linguistic cues were associated with personality states, but only in certain writing conditions. Hirsh and Peterson (2009) reported average effect sizes of correlations between personality traits and LIWC variables were $r = |0.23|$. The present study found small-to-moderate effect sizes in correlations, which was expected given that the present study assessed states (as opposed to traits) and specified writing themes of cheerfulness, seriousness, and bad mood. State variables assessed at baseline were not associated with LIWC categories, suggesting that these states were context- and situationally-dependent.

Study One reported that trait cheerfulness was positively associated with clout and negatively associated with negative emotion when participants described their past week. These findings were reflective of both the affective (i.e., appearing positive and cheerful) and cognitive component (i.e., seeing the bright side of things). The present study found that state cheerfulness was only associated with clout in cheerful writing scenarios, but not serious or bad mood writing scenarios. In addition, emotional tone and negative emotion were correlated in the expected directions with cheerfulness and bad mood, but these findings were only evident in the cheerful and serious writing scenarios. These findings revealed that word usage was context dependent and state cheerfulness did not predict less negative tone or more positive tone when participants wrote about a scenario in which they experienced bad mood. Perhaps the usage of clout and emotional tone were appropriate given the context to which state cheerful participants were speaking of. Hence, the impact of personality states on word usage may only be evident in specific contexts and situations.

Retrospective state seriousness was evidently associated with less words associated with clout and social processes and more words associated with accomplishment (e.g., achieve, work, power) in the cheerful writing scenario. Interestingly, the negative association with social processes may predict less engagement with the social environment (Hirsh & Peterson, 2009). These results reflect that individuals in the cheerful writing condition described both casual fun experiences (e.g., camping with friends), which would involve low state seriousness, and experiences involving achievement (e.g., working hard for an award), which would involve high state seriousness. Hence, for some individuals, this prompt promoted a focus on achievement of goals, which may involve descriptions of scenarios involving accomplishment (e.g., power, achieve, work) and less focus on social processes (e.g., friends, affiliations). State seriousness was negatively associated with clout and social self-esteem in the validity measures, which may imply state serious individuals were less active social explorers (Hirsh & Peterson, 2009). State seriousness was not associated with LIWC variables in the seriousness and bad mood writing condition. Again, the impact of personality states on word usage may only be evident in specific contexts and situations.

Similarly, retrospective state bad mood showed correlations with emotional tone, negative emotion, sadness, and positive emotion in the expected direction in the cheerful writing scenario. These findings are consistent with previous findings demonstrating emotional tone was associated with depression and suicidal ideation (Lumontod, 2020). These findings are consistent with Study One on LIWC category correlates with bad mood.

Interestingly, in the bad mood writing condition, state cheerfulness was associated with more present-focused terms compared to past-focus terms. In contrast, state bad mood was associated with less present-focused terms and more past-focused terms. These results may reflect on an individual's conceptualization of the reported event at the moment of assessment. For example, some respondents reported a positive learning experience from the event that triggered sadness and despondence (e.g., "I believe it was for the best," "I realized everything happens for a reason and that I can learn from my mistakes") whereas some individuals recalled significant distress at the time of the event without any mention of a positive outlook (e.g., "It was an overall horrible time, the amount of stress I put myself under but couldn't get out of was intolerable"). Future research should use qualitative methods to inquire whether cheerful individuals report themes surrounding resilience and coping when discussing scenarios that triggered sad or despondent mood.

There are some limitations to the current study. In the writing sample, university students were the sample of choice to lower participant variability in demographic variables, such as education level and age. However, the degree to which the results generalize to other diverse and heterogeneous samples is unknown. Moreover, although LIWC is a reliable and validated approach with algorithms investigating language categories (Pennebaker et al., 2003), it does not provide data on the context in which the words are utilized or the semantic structure of the sentence (Brauer & Proyer, 2020; Proyer & Brauer, 2018). Future studies should investigate writing samples at multiple levels of analysis, which can assess the structural meaning and context in which specific words are being used (Hirsh & Peterson, 2009).

Overall, the STCI-S18 can be used for future personality studies or experimental and clinical settings for more efficient assessment while still retaining reliability and validity. With the rise of cheerfulness and humor-related interventions (see Ruch & Hofmann, 2017 for a review), the short form may be beneficial for administration in conditions where retests are required. States cheerfulness, seriousness, and bad mood were associated with language use above and beyond affective expressions of smiling and laughter. The present study contributes to the literature in understanding how situational and contextual factors may impact personality states and language use.

CHAPTER 4: Study Three

Title: Psychometric Properties and Cross-Cultural Examination of the Standard Version of the State-Trait Cheerfulness Inventory in China

4.1 Introduction⁴

The State-Trait Cheerfulness Inventory (STCI) – trait version is a multidimensional measure that assesses cheerfulness and bad mood as distinct traits with cognitive and affective components, and seriousness as a cognitive and attitudinal dimension (Ruch, Köhler & van Thriel, 1996). Specifically, Ruch et al. (1996) defined trait cheerfulness as a high prevalence of cheerful mood, the predisposition to exhilarate easily and frequently, a cheerful interaction style, and a composed view of adverse life circumstances. These constructs integrate to measure the temperamental basis of the sense of humor, as high trait cheerfulness predicts exhilaration and engagement in humor-related activities, but the frequency and intensity of engagement in these interactions are affected by traits seriousness and bad mood (Ruch et al., 1996). Ruch et al. (1996) described trait seriousness represents frequent serious states across situations, the judgement of everyday happenings as important, the arrangement and planning for the long term, the preference for concrete and rationally reasoned activities, and a sober communication style. Trait bad mood was described as the prevalence of moods and behaviours related to being sad and ill-humored (i.e., sullen, grumpy, grouchy feelings)

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and an ill-humored or sad attitude towards cheerful attitudes and behaviours in one's surroundings (Ruch et al., 1996). The model posits that individuals who are in a serious frame of mind and/or in a bad mood will be less inclined to express positive affect or smile at stimuli that can be perceived as humorous (Ruch et al., 1996). Thus, comprehensive and accurate measurement of all three traits is important to fully understand the disposition and tendency to laugh and engage in humorous activities.

Robust findings show that the state-trait model of cheerfulness accounts for the inter- and intra-individual differences in amusement and exhilaration (Ruch et al., 1996; Ruch, 1997). Ruch (1997) demonstrated in experimental studies that high trait cheerful individuals expressed more frequent and intense facial signs of exhilaration when interacting with a clowning experimenter than their low trait cheerful counterparts. Moreover, trait cheerfulness was a better predictor of humor-related behaviors including sense of humor variables, humor-induced positive affect, Duchenne displays, and frequency and intensity of exhilaration than broader level major personality dimensions (e.g., positive affect, extraversion; Ruch, 1997; Ruch & Hofmann, 2012). Numerous research findings suggest the temperamental basis of humor provides significant psychosocial (e.g., emotional intelligence, emotional regulation, life satisfaction; López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2018; Ruch & Hofmann, 2012) and physical health benefits (Ruch & Hofmann, 2012). These findings have led to the implementation of numerous cheerfulness-enhancing and humor training interventions (see Ruch & Hofmann, 2017 for a review).

Almost all empirical research on cheerfulness has been conducted in Western cultures and research is needed to investigate whether several elements of the state-trait

model of cheerfulness and its associations with humor, personality, and well-being replicate in Eastern cultures. The original component or long trait form of the STCI (i.e., STCI-T106) in German, Chinese, and English consists of 106 items for the measurement of traits cheerfulness (STCI-T CH; 38 items), seriousness (37 items), and bad mood (31 items; Chen, Ruch, & Li, 2016; Ruch et al., 1996; Ruch & Hofmann, 2012). A standard trait version has also been created with 60 items derived from the larger set of 106 items to provide a more economic assessment of the three traits and this version has been widely used and translated in 13 languages (Ruch & Hofmann, 2012; Chen, Ruch, & Li, 2016). Chen and colleagues (2016) translated the STCI-T106 from English to Chinese but instead of using the same set of items as the other standard versions with 60 items (i.e., 20 items per subscale), the authors selected items from the long form for their own version with cheerfulness (21 items), seriousness (21 items), and bad mood (18 items). While Chen and colleagues (2016) found strong internal consistency and acceptable model fit for the three-factor model in their 60-item measure, the lack of convergence and different set of items create difficulties for cross-cultural comparisons with other standard versions. Different sets of items preclude the examination of measurement equivalence (e.g., multigroup confirmatory factor analysis or differential item functioning) and comparisons across different linguistic versions may arise from distinct measurement properties as opposed to meaningful cultural differences (Byrne, 2012). Furthermore, cross-cultural studies using different linguistic adaptations examining STCI traits as variables of interest cannot be directly compared when the measure consists of a different set of items.

One solution is to adapt the standard version of the STCI-T60 from Chen and colleague's (2016) longer STCI-T106 using items consistent with other standard versions. The primary goal of the present research was to develop a comprehensive assessment of the STCI-T60 that is consistent with other standard versions to allow for cross-cultural comparisons. To achieve this goal, the first aim was to assess the reliability and validity of the standard version of the STCI-T60 using a common set of items consistent with other internationally translated versions (e.g., English, Chilean-Spanish, and Italian versions). While the STCI includes both trait and state versions, only the trait version was examined in this study. Previous research demonstrated that East Asians tend to endorse more contradictory elements of emotions in good and bad feelings and tolerate opposing emotions better than North Americans (Goetz, Spencer-Rodgers, & Peng, 2008). Dialectical cultures value balance over positivity in the emotional experience, whereas individualistic cultures perceive positive emotions to be desirable as personal expressions promote individuality (Tsai, Knutson, & Fung, 2006). Thus, it is anticipated that the negative association between cheerfulness and bad mood would be less pronounced compared to English-speaking participants in Western cultures using a common set of items.

The second goal was to analyze whether distinct associations between STCI traits and humor styles, major personality dimensions, and well-being were similar to those in Western cultures when tested in Chinese participants. To date, no study has evaluated trait-by-trait interactions of the temperamental basis of humor with humor styles or broader level personality dimensions in China. The cognitive and attitudinal dimension of trait seriousness is typically associated with insightfulness, dignity, and respect in

Chinese philosophies. Thus, seriousness is expected to be positively associated with well-being in Chinese culture (Yue, 2017). Given that the three traits measured in the STCI represent the temperamental basis of humor, empirical insights on cross-cultural differences offer a promising approach in analyzing the relational pattern of stylistic expressions of humor, broader level personality dimensions, and associated concepts (e.g., well-being) that could be shaped by different processes affected by cultural factors. For instance, Oishi (2006) found that Chinese individuals with high latent life satisfaction scores tended not to endorse items related to one's satisfaction with past accomplishments (i.e., items four and five) on the satisfaction with life scale. As such, a thorough investigation of the stable set of emotional and behavioural characteristics should be conducted in East Asian cultures (i.e., China). These findings would inform conceptual overlaps between the STCI, major personality dimensions, humor styles, and well-being in China.

The third goal was to examine measurement equivalence between the English and Chinese versions of the STCI-T60 using multigroup confirmatory factor analysis. With psychological research becoming increasingly multicultural and diverse, such analyses could determine whether translated measures are interpretable and provide a basis for culturally competent assessment (van de Vijver & Poortinga, 2004). Overall, the investigation of these key research questions would make critical contributions to cross-cultural research in humor and provide implications to uncover mechanisms that promote culturally distinct goals, values, and practices in exhilaration and humor.

4.2. Methods

4.2.1. Participants and Procedure

A total of 345 participants (59% female; $M_{age} = 23.58$; $SD_{age} = 4.45$; age range [18, 54]) were recruited from two large universities, including Beijing Normal University (39.1%) and Beijing University of Technology (52.5%), located in Beijing, China. The remaining respondents (8.3%) were participants of a workshop held in Beijing. The majority (88.2%) identified as Han Nationality and the remaining identified as minority. An additional 632 undergraduate participants (61.1% females; $M_{age} = 19.10$; $SD = 1.88$; age range [16,36]) were recruited from a large Canadian University to complete the English STCI for a cross-national comparison of the measure. The validity measures were only completed by Chinese participants. Participation was voluntary and participants were debriefed after completing the survey.

4.2.2. Measures

Temperamental Basis of Humor. The standard version of the State Trait Cheerfulness Inventory – Trait Version (STCI-T60; Ruch et al., 1996; Chinese version translated by Chen et al., 2016) measures three dimensions of cheerfulness, seriousness, and bad mood. The authors of the present study selected 60 items consistent with the English version proposed by Ruch et al. (1996) and Hofmann, Carretero-Dios, and Carrell (2018). Items on this version of the STCI-T60 are equivalent to the English standard version comprised of 60 items utilizing a four-point scale (1 = *strongly disagree*, 4 = *strongly agree*). Though Chen and colleagues (2016) referred to their questionnaire as the standard version, the present instrument reflects the selection of items consistent with other adapted versions (e.g., English, Italian, Chilean-Spanish), thus constituting a “standard

version” in its present form (Hofmann et al., 2018; Ruch et al., 1996). High internal consistency, factorial, convergent, and discriminant validity across multiple translated versions of this measure were found (Ruch et al., 1996).

Personality. The Mini-IPIP is a 20-item measure of the Big-Five personality factors including extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience evaluated on a seven-point Likert-type scale (1 = *very inaccurate*, 7 = *very accurate*; Donnellan, Oswald, Baird, & Lucas, 2006). Evidence of internal consistency, structural, convergent, and discriminant validity were found for the Chinese adaptation (Chinese version translated by Li, Sang, Wang, & Shi, 2012).

Humor Styles. The Humor Styles Questionnaire (HSQ) measures two functions of benign styles of humor (e.g., self-enhancing, affiliative) hypothesized to facilitate social relationships and well-being through engagement in spontaneous and witty banter and two maladaptive styles (e.g., aggressive, self-defeating) hypothesized to increase interpersonal tension and lower well-being (Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003; Chinese version translated by Chen & Martin, 2007). The HSQ demonstrated strong evidence of construct validity and has been used in more than 125 published studies in over 30 languages (Martin & Kuiper, 2016).

Satisfaction with Life. The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985; Chinese version translated by Oishi, 2006) was designed to measure cognitive aspects of subjective well-being with a seven-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). The SWLS demonstrated high reliability, structural, convergent, and discriminant validity (Diener et al., 1985). With past research indicating SWL items concerning personal accomplishments (i.e., items four and five)

were less indicative of SWL in the Chinese compared to North Americans, individual item correlations of the SWLS were conducted with total scores of cheerfulness, seriousness, and bad mood (Oishi, 2006).

Emotional Well-Being. The TEIQue–SF well-being subscale consists of six items on a seven-point Likert scale (1 = *completely disagree*; 7 = *completely agree*) designed to measure a generalized sense of emotional well-being and positive self-regard (Cooper & Petrides, 2010; Chinese version translated by Shi & Wang, 2007).

4.3. Results

4.3.1. Confirmatory Factor Analysis (CFA)

The original STCI and other translated versions (e.g., Italian, Spanish) produced item parcels based on theoretical facets that each item was intended to measure (Ruch et al., 1996; Carretero-Dios et al., 2014). The parceling procedure produces lower measurement error and addresses complications regarding non-normality in single item distributions (Gibbons & Hocevar, 1998). Four indicators for bad mood and five indicators for cheerfulness and seriousness were created for a total of 14 indicators. The confirmatory factor analysis (CFA) was performed using SPSS AMOS 5.0.

Each facet demonstrated significant variability ($SD > 1$) and did not deviate from normal distribution. The fit of the proposed three-factor measurement model was assessed with the maximum likelihood estimation for parameter estimation. Goodness-of-fit was evaluated using the χ^2/df ratio, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). Byrne (2012) recommended RMSEA values of approximately .10 and .06 and CFI and TLI $\geq .90$ and .95 suggested moderate and excellent model fit, respectively. The fit of the three-factor

model was moderate-to-excellent: $\chi^2(74) = 245.8, p < .05, \chi^2/df = 3.32, CFI = .95, TLI = .93, RMSEA = .08$. Standardized factor loadings were statistically significant and loaded onto its hypothesized factor: .76 to .84 for cheerfulness, .59 to .79 for seriousness, and .81 to .93 for bad mood. The structural model showed associations between cheerfulness and seriousness ($r = .46, p < .001$), seriousness and bad mood ($r = .25, p < .001$), and cheerfulness and bad mood ($r = -.26, p < .001$). Hence, the observed variables demonstrated strong evidence for a well-fitting three-factor structure and Cronbach's alpha was acceptable for cheerfulness ($\alpha = .91$), seriousness ($\alpha = .85$), and bad mood ($\alpha = .94$). Overall, the model fit was excellent, and the subscales demonstrated strong reliability in this sample.

4.3.2. Associations between Subscales and Related Concepts

The inter-factor correlation analyses showed that cheerfulness was negatively associated with the bad mood subscale ($r = -.23, p < .001$). Unexpectedly, seriousness showed positive correlations with both cheerfulness ($r = .40, p < .001$) and bad mood ($r = .22, p < .001$). Based on evidence of cultural variations in dialectical epistemologies in cognition and emotion, curvilinear relationships were tested (see Spencer-Rodgers, Williams, & Peng, 2010 for a review). To examine whether a curvilinear relationship emerged between bad mood with seriousness, a quadratic product term was created for the bad mood term to enter into a multilevel hierarchical regression analysis. The predictor variable was centered around the mean scores prior to creating a quadratic product to avoid multicollinearity.

The first model showed a significant linear association between bad mood and seriousness ($\beta = .22, t = 4.31, p < .001, R^2 = 4.8\%$). In the second model, the addition of

the bad mood quadratic product term resulted in a significant change in the multiple correlation squared ($\beta = .40$, $t = 8.64$, $p < .001$, $\Delta R^2 = 16.0\%$), suggesting the presence of a curvilinear association. The function of bad mood and seriousness was U shaped and analyses on the linear association at various levels of bad mood (i.e., Mean \pm 1SD) were conducted. Seriousness and bad mood were not associated for individuals with bad mood one standard deviation below the mean ($r = -.19$, $p > .05$) or at the mean ($r = .09$; $p > .05$), but these variables were positively associated at high levels of bad mood ($r = .39$, $p < .01$). Similarly, a multilevel hierarchical regression analysis with bad mood predicting cheerfulness was conducted with the quadratic product term of bad mood entered in the second model (Table 8). Diagrams of the linear and curvilinear fit in these models are provided (Appendix E).

Cheerfulness was positively associated with both satisfaction with life (SWL; $r = .46$; $p < .001$) and emotional well-being (EWB; $r = .56$; $p < .001$). Seriousness also showed positive correlations with SWL ($r = .35$; $p < .001$) and EWB ($r = .19$; $p < .001$), but to a lesser extent compared to trait cheerfulness. Bad mood was not associated with SWL ($r = -.04$; $p > .05$), but strongly negatively associated with EWB ($r = -.64$; $p < .001$). In terms of individual items on the SWLS, cheerfulness and seriousness both had positive correlations with all individual items of the SWLS. Bad mood showed negative to no associations with items representing personal satisfaction ($r = -.13$, $p < .05$ for item one; $r = <.01$, $p > .05$ for item 2; $r = -.18$, $p < .001$ for item three) and no to positive correlations with items relating to personal accomplishment ($r = <-.01$, $p > .05$ for item four; $r = .12$, $p < .05$ for item five). Furthermore, a curvilinear association between bad mood and EWB emerged (Table 8).

Bivariate correlations between the STCI subscales and humor styles were conducted. Associations between cheerfulness and bad mood were in the expected direction, while seriousness was negatively associated with affiliative humor ($r = -.20$; $p < .001$) and positively associated with self-enhancing humor ($r = .26$; $p < .001$) and showed no associations with aggressive or self-defeating humor.

Table 8

Multilevel Hierarchical Regression Analyses with Quadratic Product Terms of Bad Mood

	β	t	ΔR^2		Pearson's r Between Variables
Bad Mood and Seriousness					
Model 1 (Linear association)	.22	4.31***	4.8%	Mean - 1SD	-.19
Model 2 (bad mood quadratic product)	.40	8.64***	16.0%	Mean \pm 1SD	.09
				Mean + 1SD	.39**
Bad Mood and Cheerfulness					
Model 1 (Linear association)	-.23	-4.49***	5.2%	Mean - 1SD	-.42**
Model 2 (bad mood quadratic product)	.41	8.87***	16.6%	Mean \pm 1SD	-.25***
				Mean + 1SD	.23
Bad Mood and EWB					
Model 1 (Linear association)	-.64	-15.94***	40.8%	Mean - 1SD	-.45***
Model 2 (bad mood quadratic product)	.19	4.96***	3.7%	Mean \pm 1SD	-.58***
				Mean + 1SD	.02

Note. Standardized Beta coefficients were reported. EWB= emotional well-being. Model 1= Linear association. Model 2 = bad mood quadratic product term entered. * $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed.

Table 9

Means, Standard Deviations, Cronbach alphas, and Bivariate Correlates between the STCI-T60, Humor Styles, and Well-Being

	<i>M</i>	<i>SD</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Cheerfulness	2.88	.43	<i>.91</i>								
(2) Seriousness	2.75	.38	.40**	.85							
(3) Bad Mood	2.33	.57	-.23**	.22**	.94						
(4) Affiliative	3.44	.66	.27**	-.20**	-.59**	.80					
(5) Self-Enhancing	3.32	.55	.59**	.26**	-.15*	.25**	.72				
(6) Aggressive	2.52	.54	-.13	.00	.50**	-.47**	-.07	.62			
(7) Self-Defeating	2.71	.69	-.00	.09	.60**	-.36**	.13*	.56**	.79		
(8) Satisfaction with Life	4.38	.99	.46**	.35**	-.04	-.07	.29**	-.02	.02	.78	
(9) EI – Well-Being	4.80	.92	.56**	.19**	-.64**	.45**	.39**	-.36**	-.43**	.40**	.74

Note. $N = 371$. Cronbach's alpha values in diagonal are in *italics*. * $p < .01$, two-tailed. ** $p < .001$, two-tailed (adjusted level of significance to adjust for Type 1 error).

Bivariate correlations were conducted between the STCI and major personality dimensions (Appendix F). Cheerfulness was positively associated with extraversion ($r = .36; p < .001$), agreeableness ($r = .29; p < .001$), conscientiousness ($r = .24; p < .001$), and negatively correlated with neuroticism ($r = -.39; p < .001$). Seriousness was positively associated with conscientiousness ($r = .24; p < .001$). Bad mood was positively associated with neuroticism ($r = .51; p < .001$) and negatively associated with extraversion ($r = -.29; p < .001$), agreeableness ($r = -.57; p < .001$), conscientiousness ($r = -.43; p < .001$), and openness to experience ($r = -.51; p < .001$).

4.3.3. Measurement Invariance

The structural equivalence between the English and Chinese versions of the STCI were evaluated using a multigroup confirmatory factor analysis (MGCFA), with increasingly stringent hypotheses of equivalence tested through imposing equality constraints on different sets of parameters (Baumgartner & Steenkamp, 1998). First, the baseline model with unconstrained parameters (configural invariance) was compared with two different models: a model with constraints on factor loading parameters (metric invariance) and a model with additional constraints on variance and covariance parameters. Due to evidence regarding oversensitivity in the chi-square-based likelihood ratio test to sample size, the equality constraints were tested using the comparative fit index difference (ΔCFI) and Root Mean Square Error of Approximation ($\Delta RMSEA$) with values of $\leq .01$ and $\leq .015$, respectively, indicating no significant differences in nested models (Byrne, 2012; Cheung & Rensvold, 2002). Maximum likelihood estimation was utilized for all models.

A single-group confirmatory factor analysis (CFA) for the English STCI was conducted as a prerequisite for assessing invariance. The CFA of the three-factor model for the English data showed a good fit, $\chi^2(71) = 339.89$, $p < .01$, $\chi^2/df = 4.79$, RMSEA = .08, CFI = .94, TLI = .92. Standardized factor loadings ranged from .70 to .90 for cheerfulness, .59 to .74 for seriousness, and .69 to .88 for bad mood. The structural model showed cheerfulness was negatively correlated with bad mood ($r = -.74$, $p < .001$), while seriousness was not significantly associated with cheerfulness or bad mood. Internal consistency was high: cheerfulness ($\alpha = .92$), seriousness ($\alpha = .81$), and bad mood ($\alpha = .91$). Hence, both Chinese and English versions of the STCI exhibited a three-factor model and may be combined for further analyses.

The overall and comparative fit statistics of invariance models are presented in Table 10. Goodness of fit indices supported evidence for configural invariance ($\chi^2/df = 4.51$, CFI = .93, TLI = .92, RMSEA = .06). When comparing cross-cultural equality of factor loadings, the difference in CFI values between nested models was slightly greater than .01 ($\Delta\text{CFI} = .012$). Possible sources of invariance were searched to establish partial metric invariance through allowing a factor loading to vary freely across groups while constraining the other loadings to equality (Baumgartner & Steenkamp, 1998). After allowing the factor pattern coefficient for BM3 (i.e., sad and ill-humored behavior in cheerfulness evoking situations) to vary freely across the two groups, the fit of the model statistically improved, $\chi^2(1) = 42.66$, $p < .001$. Upon this modification, the difference in CFI values between nested models was less than .01 ($\Delta\text{CFI} = .007$) and the difference in RMSEA values was very small ($\Delta\text{RMSEA} = .002$). Finally, evidence for structural

invariance was not supported ($\Delta CFI = .020$; $\Delta RMSEA = .006$). Thus, equality of factor variances and covariance between factors was not observed.

Table 10

Fit Statistics for Cross-Nation Multi-group Confirmatory Factor Analysis of the STCI

Model	χ^2 (<i>df</i>)	<i>CFI</i>	<i>RMSEA</i> [90% <i>CI</i>]	Model comparison	$\Delta\chi^2$	Δdf	<i>p</i>	ΔCFI	$\Delta RMSEA$
<i>Baseline</i>	667.02 (148)	.932	.059 [.055, .064]	-	-	-	-	-	-
<i>Model 1</i>	768.49 (159)	.920	.062 [.057, .066]	<i>Model 1 - Baseline</i>	101.47	11	<.001	.012	.003
<i>Model 1a</i>	725.83 (158)	.925	.060 [.055, .064]	<i>Model 1a - Baseline</i>	58.81	10	<.001	.007	.001
<i>Model 2a</i>	890.22 (164)	.905	.066 [.062, .071]	<i>Model 2a - Model 1a</i>	164.39	6	<.001	.020	.006

Note. χ^2 = chi-square; CFI = comparative fit index; RMSEA = root mean square error of approximation; $\Delta\chi^2$ = difference in chi-squares between nested models; Δdf = difference in degrees of freedom between nested models; *p* = probability value of $\Delta\chi^2$ test; ΔCFI = difference between CFIs of nested models. $\Delta RMSEA$ = difference between RMSEAs of nested models. *Model 1* = equality of factor loadings; *Model 1a* = equality of factor loadings except BM3 facet; *Model 2a* = *Model 1a* + equality of factor variances and covariance between factors.

4.4. Discussion

The present investigation examined the psychometric properties and external validity of the standard version of the STCI-T60 in China and the measurement equivalence between English and Chinese versions. The three-factor structure

demonstrated adequate measurement properties with configural invariance and partial metric invariance observed as most of the factor loading coefficients did not statistically differ across groups. Baumgartner and Steenkamp (1998) argued that a limited number of non-invariant indicators ensured the meaningfulness of cross-group comparisons. As expected, structural invariance was not observed, as the correlations amongst the three different dimensions of the STCI differed between the English and Chinese groups. Cheung and Rensvold (1998) suggested structural non-invariance may assist the investigation for cultural differences. Further work should examine sources of non-invariance and, whenever possible, analyses both excluding and including non-invariant items should be performed. Notably, when comparing major personality traits and well-being measures across cultures, previous research showed many items demonstrated item-level non-invariance (e.g., Church et al., 2011; Oishi, 2006). Hence, the issue of measurement invariance across translated measures must be addressed to improve generalizability of cross-cultural research in trait measurement.

In the Chinese sample, trait seriousness was positively correlated with both cheerfulness and bad mood. Closer examination suggested bad mood showed curvilinear associations with cheerfulness, seriousness, and EWB. Taken these results together, those with high trait bad mood showed positive associations with seriousness, a trait associated with well-being in this sample, and no associations with EWB and cheerfulness. Future studies should examine whether trait seriousness associated with high levels of bad mood could act as a protective factor for Chinese individuals. While bad mood was not associated with SWLS scores, item-level analyses showed even Chinese individuals with high latent life satisfaction scores tend not to endorse items relating to one's satisfaction

with past accomplishments (Oishi, 2006). Previous research findings could explain why high levels of trait bad mood may not be detrimental to psychosocial well-being in China. First, dialectical thinking (i.e., considering both ends of the extremes to achieve middle ground) predicted greater emotional complexity and lower well-being in Chinese than European Americans, but “finding the bad in the good” is a commonly shared attitude under adverse circumstances for Chinese individuals (Spencer-Rodgers et al., 2010). Second, East Asians more comfortably endorsed simultaneous activation of affective opposites and greater self-evaluate ambivalence, but these qualities were not associated with SWL, anxiety, or depression (Goetz et al., 2008; Spencer-Rodgers et al., 2010). Third, between-person analyses (i.e., aggregates of moment reports) were more influenced by implicit beliefs regarding emotions, compared to within-person levels in which opposing feelings in mood are rarely endorsed together in East Asian cultures (Scollon, Diener, Oishi, & Biswas-Diener, 2005). Given that the present study only conducted between-person analyses, individuals from East Asian cultures may endorse more opposing feelings in mood (i.e., endorsing sadness and ill-humored thinking and behaviours associated with trait bad mood while endorsing positive subjective well-being). Lastly, individuals who experience negative emotions frequently experienced positive emotions frequently, as sympathy from family and friends tended to accompany negative emotional experiences for East Asians more than European Americans (Spencer-Rodgers et al., 2010). Perhaps Chinese individuals with high trait bad mood tended to receive these benefits that individuals at average and low trait bad mood did not experience.

The direction of the correlational patterns between the STCI and major personality dimensions was entirely consistent with Carretero-Dios and colleagues (2014). Cheerfulness was positively associated with extraversion, agreeableness, conscientiousness, and negatively correlated with neuroticism while seriousness was positively associated with conscientiousness. Bad mood was positively associated with neuroticism and negatively associated with the other four major personality dimensions. It is worth noting that the positive association between extraversion and cheerfulness was much stronger in English and Spanish samples than the present Chinese sample (Carretero-Dios et al., 2014; Wrench & McCroskey, 2001). Future studies should investigate whether the overlap between extraversion and cheerfulness being comparatively smaller in Chinese participants compared to individuals from Western cultures is replicable.

The present study demonstrated cheerfulness showed consistent correlational patterns with humor styles when compared to an English sample reported by Martin and colleagues (2003). Specifically, cheerfulness was positively associated with affiliative humor and self-enhancing humor. Consistent with Martin and colleagues (2003), the present study found trait seriousness was negatively associated with affiliative humor. However, seriousness was negatively associated with aggressive humor in the English sample but showed no significant association in the Chinese sample. In the Chinese sample, seriousness was positively associated with self-enhancing humor, but this pattern was not found in the Martin and colleague's (2003) English sample. Both the English and Chinese sample showed negative associations between bad mood and benign humor styles and positive associations between bad mood and self-defeating humor. In contrast,

Martin et al. (2003) found no significant association between bad mood and aggressive humor, while the present Chinese sample showed bad mood and aggressive humor exhibited a strong positive correlation. These results suggest that aggressive humor may fall in a different location in the three-dimensional space defined by the STCI.

Traits cheerfulness and seriousness were both positively associated with measures of well-being in China. Comparatively, previous findings suggested seriousness showed negative associations with indicators of well-being (Carretero-Dios et al., 2014; López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2017). Early Chinese philosophies described Confucius as respectful and showed tasteful, good-natured humor while retaining a serious attitude for life (Yue, 2017). Similarly, Chen et al. (2016) found a small but significant association between trait seriousness and future temporal satisfaction with life. Compared to China, seriousness in Western cultures may be regarded as a stringent or inflexible way of thinking. Future studies should examine the conceptualization of seriousness in Chinese culture and its associations with humor and well-being. Interestingly, Proyer & Rodden (2013) investigated the concurrence of high cheerfulness and high seriousness within individuals and posited that these individuals experience positivity and a cheerful composure but also recognized the importance of everyday happenings. Seriousness alone does not predict playfulness, but high seriousness and high cheerfulness co-occurring could reflect an active and energetic approach to playfulness. Future research should examine whether cheerfulness and seriousness combined predict a “more profound, philosophical sense of humor” in the Chinese context (Ruch & Hofmann, 2012; pg. 102).

This study has limitations that require further investigation. The heavy reliance on self-report measures largely depends on the insight of the individual and inflated estimates could emerge based on shared method variance. Future research should replicate these findings using momentary assessments with state forms and peer-ratings. Furthermore, although the HSQ is one of the most widely used self-report humor questionnaires, recent criticism questions the utility of the HSQ in personality measurement, including small effects related to well-being when personality was controlled for, non-humorous components dominating humorous aspects, and lack of convergence between conceptualization of humor styles (Ruch & Heintz, 2013; Heintz & Ruch, 2018). Future studies should investigate the correlates of the STCI with other humor measures in China. Lastly, closer examination of the scatter plots showed few participants with extreme scores in bad mood, cheerfulness, and seriousness. Future studies should replicate the present findings using a larger sample and investigate whether these patterns replicate with extreme scorers (e.g., Mean \pm 2 SD). Despite limitations and areas for future research, the present study extended the literature through examining the reliability, structural validity, external validity, and measurement invariance of the standard version of the Chinese STCI. Future research may utilize this self-report measure in experimental investigations as well as cheerfulness-enhancing and humor-based interventions to create a broader theoretical framework in the cross-cultural conceptualization of humor.

CHAPTER 5: Study Four

Title: The Italian Version of the State-Trait Cheerfulness Inventory Trait Form: Psychometric Validation and Evaluation of Measurement Invariance⁵

5.1. Introduction

With the beneficial effects of humor on physical and psychosocial wellness emerging in the literature, psychologists have shown increasing interest in measuring temperamental aspects of this construct (Lefcourt, 2001; Ruch, 2008). Rather than solely focusing on contextual variables in humor, psychological researchers have argued individual differences may emerge in attitudes and preferences for humor, as well as the habitual reactions to humor (Ruch et al., 1996; Ruch & Hofmann, 2012; Ruch & Hofmann, 2017). As such, the temperamental basis of humor may be conceptualized as a combination of attitudinal, emotional, and cognitive facets that predispose an individual to experience positive emotions and enjoy humor with others (Ruch et al., 1996). This model is comprised of traits and states cheerfulness, seriousness, and bad mood, which accounts for inter- and intra-individual differences in amusement and exhilaration (Ruch et al., 1996; Ruch & Köhler, 1998). The state manifestation of cheerfulness, seriousness, and bad mood relates to intraindividual differences that fluctuates and changes according to situational and contextual factors, whereas the trait manifestation acts as a stable predictor of individual differences across time and situations.

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The State-Trait Cheerfulness Inventory (STCI-T; Ruch et al., 1996) Trait Version is a self-report, multidimensional measure that assesses latent traits of both cheerfulness and bad mood as conceptually distinct emotional facets, and seriousness as an attitudinal and cognitive facet (Carretero-Dios, Benítez, Delgado-Rico, Ruch, & López-Benítez, 2014; Ruch et al., 1996; Ruch, Köhler, & van Thriel, 1997). This instrument was developed based on the theoretical conceptualization that while high cheerfulness plays a prominent role in the tendency to engage in humor-related activities, heightened traits seriousness and bad mood could affect frequency, intensity, and duration of exhilaration (Ruch et al., 1996). For instance, an individual with high trait cheerfulness who is ill-humoured and/or in a serious frame of mind may not display positive affect or be engaged in playful interactions that one may expect for a cheerful person (Ruch et al., 1996; Ruch & Carrell, 1998; Ruch & Hofmann, 2012).

Previous analyses reflected that the three dimensions on the STCI showed strong reliability and good fit indices (Hofmann, Carretero-Dios, & Carrell, 2018; Ruch et al., 1996; Ruch & Hofmann, 2012). Similarly, Studies One, Two, and Three demonstrated a well-fitted three-dimensional model for the English trait, English state, and Chinese trait versions. The STCI has shown strong psychometric properties and a replicable three-factor structure across over 10 different language versions (Hofmann et al., 2018; Ruch et al., 1996; Ruch & Hofmann, 2012). Specifically, Hofmann and colleagues (2018) tested six different models and the three-factor model showed superior fit compared to the two- and one-factor models. Moreover, the three-factor structure has been supported and well-replicated in previous work in self-report state forms (e.g., Ruch et al., 1997; López-Benítez et al., 2017), trait forms (e.g., Ruch et al., 1996; Carretero-Dios et al., 2014;

Chen, Ruch, & Li, 2017), and peer-report or couple versions (e.g., Ruch et al., 1996; Tapia-Villanueva, Pereira, & Molina, 2014). Moreover, Lopez-Benitez, Acosta, Lupianez, and Carretero-Dios (2017) found evidence for configural, metric, and scalar invariance across men and women for the state version of the STCI. Empirical studies have validated convergent and discriminant validity for these different forms in measuring cheerfulness, seriousness, and bad mood using multitrait multimethod approaches for sources of individual differences (Carretero-Dios, Eid, & Ruch, 2011). These findings demonstrated convergent and discriminant validity across instruments in measuring traits cheerfulness, seriousness, and bad mood when using these different methods (i.e., self-report trait form, state form for eight consecutive days, peer-report; Carretero-Dios et al., 2011).

In terms of test-criterion validity, the STCI accounted for a large proportion of the variance in sense of humor, humor orientation, and humor creation measures (Wrench & McCroskey, 2001). In terms of major personality dimensions, Wrench and McCroskey (2001) found that cheerfulness and bad mood were positively and negatively associated with extraversion, respectively, while seriousness was not associated with extraversion. Carretero-Dios and colleagues (2014) found that the trait version of the STCI-T in Spanish showed substantive overlaps with major personality dimensions, including cheerfulness with extraversion, seriousness with conscientiousness, and bad mood with neuroticism. Moreover, cheerfulness was positively associated with psychological well-being variables, including happiness, hope, and life satisfaction (Carretero-Dios et al., 2014). Seriousness and bad mood were negatively associated with happiness and these

traits were positively associated with anxiety and depression. Hence, the present study will examine whether these associations replicate in the Italian version of the STCI.

Beyond the theoretical model and measurement properties, research has consistently indicated the importance of cheerfulness, as a mood state and personality trait, in predicting psychological well-being, positive affect, positive emotional regulation and management, and personal resiliency (Lopez-Benitez, Acosta, Lupianez, & Carretero-Dios, 2017, 2018; Ruch & Kohler, 1999; Ruch & Hofmann, 2012).

Specifically, López-Benítez and colleagues (2018) found that individuals with high trait cheerfulness reported greater affective state changes than low trait cheerful counterparts for both positive and negative affective induction, which the authors postulated that trait cheerfulness is linked with greater permeability to the affective environment. High trait cheerful individuals showed greater facial signs of frequent and intense exhilaration when interacting with a clowning experimenter and greater state cheerfulness when listening to funny tapes (Ruch, 1997). In a study investigating trait cheerfulness in a hospital clown intervention, high trait cheerful individuals showed more Duchenne smiles and experienced positive emotions to a greater extent than their low trait cheerful counterparts (Auerbach, 2017). Moreover, trait cheerful individuals are more likely to stay in a cheerful mood when writing negative content (Ruch & Hofmann, 2012).

In terms of physical health, high trait cheerful individuals also benefit from better physical health and less psychosomatic disturbances (e.g., headache, tonicity, cardiac and circulatory troubles; Martin, 2001; Ruch et al., 1996; Ruch, 2008). Interestingly, higher state cheerfulness was found to be associated with lower values of disease activity and C-reactive protein in patients with ankylosing spondylitis and rheumatoid arthritis

(Delgado-Dominguez, Font-Ugalde, Ruiz-Vilchez, Carretero-Dios, & Collantes-Estevez, 2014; Delgado-Domingue et al., 2016). Increasing trait and state cheerfulness through humor training interventions and cheerfulness-enhancing practices have also been documented to be beneficial for emotional stimulation and depressed mood changes (Falkenberg, Buchkremer, Bartels, & Wild, 2011; Hirsch & Kranzhoff, 2004; Hirsch et al., 2010; Konradt et al., 2013). For individuals who participate in humor training, life satisfaction increased when comparing intraindividual differences in pre- and post-intervention, and humor training also increased cheerfulness and decreased seriousness (Ruch, Hofmann, Rusch, & Stolz, 2018). It becomes clear that these constructs related to the temperamental basis of the sense of humor are associated with positive physical and psychological outcomes. To enhance the availability of assessment of humor interventions and empirical research on humor in Italy, the STCI can be used with other translated humor measures (e.g., humor styles questionnaire) in Italian. Thus, it becomes important to evaluate the measurement properties of this construct to further expand these areas of research.

5.1.1. Objectives

The objectives of the study were to develop the Italian version of the State-Trait Cheerfulness Inventory, assess its reliability and validity, and examine the measurement equivalence with the English version. More precisely, two main types of validity evidence have been considered with the Italian version: (a) evidence based on the internal structure and (b) evidence based on the relations to other related psychological concepts (i.e., test-criterion relationships; AERA, APA, & NCME, 2014). While the STCI includes both trait and state versions, only the trait version was examined in this study.

In order to promote cross-cultural research in future studies, measurement equivalence should be established to provide evidence that the overall scale and its individual items have equivalent meaning to individuals belonging to different cultures (Reise, Widaman, & Pugh, 1993; Vandenberg & Lance, 2000; van de Vijver & Poortinga, 2004). As such, measurement invariance analyses provide evidence that differences in test scores reflect true latent variable differences than group differences based on measurement bias (Mellenbergh, 1989; Meredith, 1993). Confirmatory factor analysis (CFA) was utilized to evaluate structural equivalence across adapted sequences to analyze multiple groups simultaneously in providing statistical tests as well as descriptive indices of model fit (Byrne & van de Vijver, 2014; Sireci, Patsula, & Hambleton, 2005). Specifically, factorial invariance exists with respect to a construct when the associations between construct and item, as represented by factor loadings, must not be significantly different across English and Italian versions (Mullen, 1995; Singh, 1995). This method would allow inference on whether there is appreciable degradation of a more parsimonious model with respect to a more complex one (Chen, 2007).

5.2. Methods

5.2.1. Participants and Procedure

Sampling was based on the “snowball” method (Biernacki & Waldorf, 1981). Undergraduate students in a psychology course were invited to participate in this questionnaire study and were encouraged to recruit their acquaintances and relatives to participate as well. The Italian sample consists of 683 participants (ages ranged from 18 to 84 years; $M = 34.09$, $SD = 16.27$; 54.3% females). Of this sample, 345 (50.5%) of

participants were undergraduate students from a large university in central Italy. A total of 653 participants completed questionnaires online and 30 participants completed paper and pencil versions. Validity measures were completed by the full sample, with the exception of the HEXACO model of personality structure which was completed by a subset of the student sample ($n=104$) who had the option of completing the HEXACO at a different time. In addition, a subset of 50 students (90% female; $M_{\text{age}} = 21.50$, $SD = 4.04$) between 20 to 48 years of age completed the STCI again in a four- to five-week interval to determine test-retest reliability. Students were encouraged to complete the test-retest battery during class. Participants were provided an informed consent form and instructed to carefully read and sign the informed consent form. All forms were returned and retained by the principal investigator.

The English-speaking sample consists of 632 undergraduate students (61.1% females) from the University of Western Ontario in Canada who only completed the English State-Trait Cheerfulness Inventory – Trait Version (STCI-T60; Ruch et al., 1996) online using Qualtrics, a web-based survey tool. Students' ages ranged from 16 to 36 years ($M = 19.10$, $SD = 1.88$). The English-speaking sample did not complete the validity measures. The majority of participants were born in Canada (71.8%). Participation in the study was voluntary and participants received credits toward a psychology course. Following the completion of the scales, participants were debriefed. The study was approved by the Non-Medical Research Ethics Board at the University of Western Ontario prior to data collection.

5.2.2. Measures

State-Trait Cheerfulness Inventory. The standard version of the State Trait Cheerfulness Inventory – Trait Version (Ruch, Köhler, & van Thriel, 1996) is comprised of 60 items providing scores on three factors relating to the theoretically-derived temperamental basis of sense of humor (i.e., cheerfulness, seriousness, bad mood). The constructs are measured on a four-point Likert-style scale (1=*strongly disagree*; 4=*strongly agree*). Following recommendations of standardized guidelines for test translation (Hambleton & Lee, 2013; Beaton, Bombardier, Guillemin, & Ferraz, 2010), the STCI English version underwent a standard assessment translating process into Italian by two individuals with high proficiency in English and Italian to ensure each items' lexical difficulty was maintained while retaining content equivalence. Next, a third bilingual individual experienced in test translations performed back-translation from Italian to English. Items were then reviewed side-by-side by a subject matter expert familiar with the instrument and fluent in English and Italian to ensure the content of the translated Italian version were consistent with the English version. With no significant concerns regarding translation observed between the two forms, the translated Italian version of the STCI appeared to remain consistent with the English version. The number of items in this measure are consistent with other standard versions of the STCI.

Personality. The HEXACO-60 measures six factors of personality which comprises of 60 items providing scores on honesty-humility, emotionality, extraversion, agreeableness, conscientiousness, and openness to experience (Ashton & Lee, 2009). Each response was rated using a five-point Likert-style scale ranging from 1 to 5 (1=*strongly disagree*; 5=*strongly agree*). The Italian version of the HEXACO demonstrated strong internal

consistency, structural validity, and convergent and discriminant validity (Ashton et al., 2006).

Resiliency. The Connor-Davidson Resilience Scale (CD-RISC-10; Connor & Davidson, 2003; Campbell-Sills & Stein, 2007) consists of 10 items measuring a unidimensional construct of personal resiliency. The construct was measured using a five-point Likert-style scale (0 = *not true at all* to 4 = *true nearly all the time*). The Italian version of the CD-RISC showed strong reliability, structural validity, and concurrent validity (Di Fabio & Palazzeschi, 2012).

Optimism. The Revised Life Orientation Test (LOT-R; Scheier, Carver, & Bridges, 1994;) measures dispositional optimism as the expectation for positive outcomes in the future. The measure consists of six items and four filler items on a five-point Likert scale (1= *I disagree a lot*; 5= *I agree a lot*), with higher total scores indicating greater optimism. The Italian version of the LOT-R demonstrated strong psychometric properties (Chiesi et al., 2013).

Stress. The Perceived Stressed Scale (PSS) comprised of four items, measuring self-report levels of mental and emotional strain within the last month (Cohen, Kamarck, & Mermelstein, 1983). The construct was measured using a five-point Likert scale (0=*never*; 4= *very often*). The Italian version of the PSS demonstrated strong reliability and structural validity (Mondo, Sechi, & Cabras, 2019).

Well-Being. The World Health Organization Well-Being Index (WHO-5) is a five-item measure used to quantify subjective psychological well-being. The measure has been translated to over 30 languages and respondents rate each statement according to a six-point Likert-style scale (0=*at no time*; 5= *all of the time*; Topp, Østergaard, Søndergaard,

& Bech, 2015). This measure is described as a specific and sensitive screening tool for depression and demonstrated satisfactory reliability coefficients and convergent and predictive validity (Heun, Bonsignore, Barkow, & Jessen, 2001).

5.2.3. Data Analysis

Aligned with analyses conducted on the original STCI and other translated versions (i.e., Carretero-Dios et al., 2014; Chen et al., 2016; Hofmann et al., 2018; Ruch et al., 1996), facet scores were created for item parceling. The parceling procedure was applied to lower measurement error and resolve any concerns regarding non-normality in single item distributions (Gibbons & Hocevar, 1998; Little, Cunningham, Shahar, & Widaman, 2002). Consistent with previous studies analyzing the trait version with 60 items, the BM5 facet (i.e., ill-humored behaviour of individuals in cheerfulness-evoking situations) was combined with the BM3 facet (i.e., sad behaviour of individuals in cheerfulness-evoking situations) to represent a single construct of sad and ill-humored behaviour of individuals in cheerfulness-evoking situations (Chen et al., 2016).

A confirmatory factor analysis was conducted on the three-factor model with maximum likelihood estimation for parameter estimation. Chi-square test, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA) were used to evaluate the goodness-of-fit. As recommended by Byrne (2001; 2012), a root mean square error of approximation (RMSEA) approximately .08 and .06 would suggest moderate and excellent model fit, respectively. A comparative fit index (CFI) and Tucker Lewis Index (TLI) in the range of .90 and .95 would suggest moderate and excellent model fit, respectively. All statistical analyses were conducted on SPSS version 25 and SPSS AMOS 5.0 (Arbuckle, 2003).

To examine individual item properties, item response theory analyses were applied using R: MIRT as a parametric statistical modeling procedure that provides item-level properties in relation to the individual's estimated latent trait (Embretson & Reise, 2000). Once unidimensionality, absence of local dependence, and monotonicity were confirmed for each factor, the psychometric properties of the STCI subscales were evaluated using Samejima's graded response model (GRM; Samejima, 1969). The marginal maximum likelihood estimation method with the expectation-maximization algorithm was used to estimate item parameters and the item fit under the GRM was tested with Orlando and Thiessen's (2003) $S-X^2$ statistics (Bock & Aitkin, 1981). A nonsignificant $S-X^2$ value suggests appropriate item fit under the GRM. In the GRM, an item discrimination value (a) and three category threshold (b_i) function values were generated for each item. Higher discrimination parameter values reflect a better indicator of the latent trait and less noise in measurement, as the factor weight is greater than the residual standard deviation (Samejima, 1996). Baker and Kim (2004) proposed cut-off values for item discrimination as follows: $\leq .24$ as very low, $.25$ to $.64$ as low, $.65$ to 1.34 as moderate, 1.35 to 1.69 as high, and ≥ 1.7 as very high. The threshold parameters (b_i) were scaled as a z -score ($M = 0$, $SD = 1$) and reflects amount of latent trait required for a 50% probability of endorsing the next response category.

For convergent and discriminant validity, bivariate correlations were conducted between the STCI-T and validity measures. In terms of cross-cultural invariance, the equality constraints were examined using the comparative fit index (ΔCFI) and Root Mean Square Error of Approximation ($\Delta RMSEA$) differences. A ΔCFI value $\leq .01$ (Byrne, 2012; Cheung & Rensvold, 2002) supplemented by a change $\leq .015$ in RMSEA

would indicate invariance (Chen, 2007). To assess measurement invariance in the factor structure of the STCI across the English and Italian samples, a preliminary single-group CFA was conducted to examine the factorial structure of the STCI instrument for the full-sample of Italian and English speakers separately. Additional constraints to the model were included to infer whether there was appreciable degradation of a more parsimonious model with respect to a more complex one (Chen, 2007). Maximum likelihood estimation was utilized in all of the models that were evaluated in the current study.

5.3. Results

5.3.1. Descriptive Statistics

All facets demonstrated sufficient variability ($SD > 1$) and the mean absolute value of skewness and kurtosis of the facets were .39 and .22, respectively. Mean corrected scale-facet correlations were .77, .55, and .69 for cheerfulness, seriousness, and bad mood, respectively.

5.3.2. Confirmatory Factor Analysis of the Italian Version

The model fit of the three-factor structure of the Italian version of the STCI was tested to determine whether the hypothesized three dimensions would emerge in this version. The three-factor model showed an acceptable fit, $\chi^2(71) = 296.93$, $p < .05$, CFI = .96, TLI = .94, RMSEA = .07. In terms of the structural model, the cheerfulness subscale showed a negative correlation with the bad mood subscale, $r(681) = -.59$, $p < .001$, and no other significant correlations were found between the factors. For the measurement model, every facet loaded significantly and strongly onto its hypothesized factor. Factor loadings ranged from .72 to .92 for cheerfulness, .55 to .69 for seriousness, and .69 to .92

for bad mood. Hence, the observed variables demonstrated strong evidence for a well-fitting three-factor structure.

5.3.3. Item Response Theory Analysis

Prior to item response theory (IRT) calibration, a principal axis exploratory factor analysis was conducted for each of the factors to ensure a dominant first factor existed that explained more than 20% of the variance (Reckase, 1979). Moreover, χ^2 LD statistic was computed to detect local dependence (LD) as a calculation of cross-tabulations of observed and expected frequencies which allows observations of excessive item covariation that the latent trait does not explain (Chen & Thissen, 1997). IRT models force a monotonically increasing relation between the latent variable and the probability of endorsing the item (Reise & Rodriguez, 2016). Thus, the item response data must be monotonically increasing; as trait levels increase, so should the item endorsement rates. Prior to fitting any IRT models, evaluation of the scree plots of eigenvalues in the short-form construction sample was suggestive of a dominant factor for each of the individual facets, with the first value explaining 44.6%, 24.2%, and 40.6% of cheerfulness, seriousness, and bad mood, respectively.

In the cheerfulness subscale, no significant S- X^2 item-level diagnostic statistics values emerged and absence of LD was confirmed when evaluating all marginal fit (X^2) and Standardized LD X^2 Statistics, supporting evidence for a good fit (Cai, Du Toit, & Thissen, 2011). Item discrimination values ranged from .76 to 3.10 and category threshold values ranged from -3.63 and -1.73 in b_1 and $-.03$ and 2.62 in b_3 .

Similarly, for the seriousness and bad mood factors, measurement properties in the S- X^2 item-level diagnostic statistics were confirmed for both factors. In the IRT

calibration, item discrimination values in the seriousness subscale ranged from .37 to 1.71 and category threshold values ranged from -4.90 and -2.36 in b_1 and .33 and 3.05 in b_3 . In the bad mood subscale, discrimination parameters ranged from .86 to 3.82 and category threshold ranged from -2.48 and .18 on a z -score in the lowest category b_1 and 1.03 and 3.27 in the highest category b_3 . Chi square fit statistic, item discrimination, and category threshold estimates for the STCI-T60 Italian trait version for each item were shown in Appendix G.

5.3.4. Reliability

In terms of internal consistency, cheerfulness (Cronbach's $\alpha = .93$; McDonald's $\omega = .94$), seriousness ($\alpha = .82$; $\omega = .83$), and bad mood ($\alpha = .92$; $\omega = .92$) displayed good reliability in this sample. Test-retest correlations were obtained in a small subset of individuals four to five weeks after initial assessment and the correlates were as follows: cheerfulness ($r[48] = .85$; $p < .001$), seriousness ($r[48] = .79$; $p < .001$), and bad mood ($r[48] = .87$ $p < .001$). These results revealed strong test-retest reliability levels in all subscales.

5.3.5. Test-Criterion Validity with Personality and Related Psychological Concepts

Means, standard deviations, alpha reliabilities, and bivariate correlations of the STCI and subscales of the HEXACO-60 were computed (Table 11). Consistent with other versions of the STCI, cheerfulness was correlated positively with higher extraversion, $r(102) = .64$, and negatively with emotionality, $r(102) = -.28$. However, trait cheerfulness was not associated with agreeableness, $r(102) = .10$, $p > 0.05$. Trait seriousness was positively associated with conscientiousness, $r(102) = .39$, and openness with experience, $r(102) = .35$. Moreover, trait bad mood was positively associated with

emotionality, $r(102)=.43$, and negatively associated with agreeableness, $r(102)= -.31$, and extraversion, $r(102)= -.47$. All aforementioned correlations, unless otherwise specified, were significant ($p < .001$).

Mean, standard deviation, Cronbach's alpha, and bivariate correlations of the STCI and measures of related psychological concepts were conducted (Table 12). Consistent with Carretero-Dios et al. (2014), bad mood was negatively correlated with indicators of individual dispositions of optimism, $r(681)= -.56$, and resiliency, $r(681)= -.45$. Moreover, bad mood was negatively associated with indicators of psychological well-being, including general well-being, $r(681)= -.51$, and stress, $r(681)=.59$. In contrary, cheerfulness was positively associated with resiliency, $r(681)=.49$, and optimism, $r(681)= .44$. As expected, cheerfulness also showed positive relations with well-being, $r(681)=.45$, and negative relations with stress, $r(681)= -.37$. For trait seriousness, it was associated with resiliency, $r(681)=.28$. All aforementioned correlations were significant ($p<.001$).

Table 11

Means, Standard Deviations, Cronbach alphas, and Bivariate Correlates between the STCI-T and the HEXACO-60

Scales	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
STCI-T											
(1) Cheerfulness	2.89	.60	.95								
(2) Seriousness	2.94	.36	.04	.75							
(3) Bad mood	2.24	.63	-.53*	.06	.94						
HEXACO-60											
(4) Honesty-Humility	3.57	.66	.02	-.02	-.12	.78					
(5) Emotionality	3.5	.59	-.28*	.01	.43*	.11	.76				
(6) Extraversion	3.02	.73	.64*	-.04	-.47*	-.00	-.27*	.81			
(7) Agreeableness	2.81	.64	.18	-.00	-.31*	.18	-.15	.08	.71		
(8) Conscientiousness	3.72	.70	.03	.39*	-.18	.06	.02	.21	.13	.83	
(9) Openness to	3.48	.61	.10	.35*	-.13	.09	-.09	.12	.03	.14	.70
Experience											

Note. $N = 104$. Cronbach alphas in diagonal are in *italics*. * $p < .001$ (adjusted level of significance to adjust for Type 1 error).

Table 12

Means, standard deviations, Cronbach alphas, and bivariate correlates between the State-Trait-Cheerfulness-Inventory Trait Version with 60 items (STCI-T60) and related psychological concepts in Italian

STCI	<i>M</i>	<i>SD</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Cheerfulness	2.91	.54	<i>.93</i>						
(2) Seriousness	2.90	.41	.04	<i>.82</i>					
(3) Bad Mood	2.12	.58	-.53*	.06	<i>.92</i>				
Individual Disposition									
(4) Resiliency	2.45	.70	.49*	.28*	-.45*	<i>.86</i>			
(5) Optimism	3.22	.78	.44*	.01	-.56*	.48*	<i>.80</i>		
Well-Being									
(6) Stress	2.62	.84	-.37*	-.04	.59*	-.46*	-.50*	<i>.77</i>	
(7) Well-Being	3.73	.91	.45*	.10	-.51*	.40*	.46*	-.61*	<i>.86</i>

Note. $N = 682$. Cronbach alphas in diagonal are in *italics*. * $p < .001$ (adjusted level of significance to adjust for Type 1 error).

5.3.6. Cultural Invariance for the STCI

The CFA of the three-factor model for the English data showed a good fit, $\chi^2(71) = 339.89$, $p < .01$, CFI = .94, TLI = .92, RMSEA = .08. In the English version, factor loadings ranged from .70 to .90 for cheerfulness, .59 to .74 for seriousness, and .69 to .88 for bad mood. In terms of internal consistency, cheerfulness ($\alpha = .92$), seriousness ($\alpha = .81$), and bad mood ($\alpha = .91$) displayed good reliability in the English sample. Hierarchically nested series of confirmatory factor analyses were applied (Meredith, 1993). The unconstrained model was used as the baseline (i.e., baseline model) for configural invariance (i.e., if the two groups share the same factor structure) along with three more restrictive models were included: Model 1a in which factor loadings were constrained to be equal across groups, Model 1b in which factor loadings plus factor variances and the covariance were constrained to be equal across groups, and Model 1c in which factor loadings, factor variances and covariances plus error variances were constrained to be equal across groups. Model 2 included factor loadings and intercepts being constrained to be equal across groups.

The differences in CFI values between nested models were found to be less than .01 when comparing cross-cultural equality of factor loadings (Model 1a – Baseline), equality of factor variances and covariance between factors (Model 1b – Model 1a), and error variances (Model 1c – Model 1b). Moreover, RMSEA change values were $\leq .015$ in all simultaneous comparisons, which also support evidence for substantial equivalence of factor model parameters. When examining scalar invariance (Model 2 – Model 1a), the

differences in CFI values and RMSEA values exceed .01 and .015, respectively, and thus, differences exist in intercepts between these groups (Table 13).

Table 13

Fit Statistics for the Multi-group Confirmatory Factor Analysis of the STCI across Italian and English speakers

Model	χ^2 (<i>df</i>)	CFI	RMSEA [90% <i>CI</i>]	Model comparison	$\Delta\chi^2$	Δdf	<i>p</i>	ΔCFI	$\Delta RMSEA$
<i>Baseline</i>	731.75 (144)	.938	.056 [.052, .060]	-	-	-	-	-	-
<i>Model 1a</i>	790.44 (155)	.933	.056 [.052, .060]	<i>Model 1a - Baseline</i>	58.69	11	<.001	.005	.000
<i>Model 1b</i>	858.70 (161)	.926	.057 [.054, .061]	<i>Model 1b - Model 1a</i>	68.26	6	<.001	.007	.001
<i>Model 1c</i>	946.77 (177)	.919	.058 [.054, .061]	<i>Model 1c - Model 1b</i>	88.07	16	<.001	.007	.001
<i>Model 2</i>	1437.53 (169)	.866	.076 [.072, .079]	<i>Model 2 - Model 1a</i>	647.09	14	<.001	.067	.020

Note. χ^2 = chi-square; CFI = comparative fit index; RMSEA = root mean square error of approximation; $\Delta\chi^2$ = difference in chi-squares between nested models;

Δdf = difference in degrees of freedom between nested models; *p* = probability value of $\Delta\chi^2$ test; ΔCFI = difference between CFIs of nested models. $\Delta RMSEA$

= difference between RMSEAs of nested models. *Model 1a*=equality of factor loadings; *Model 1b*= *Model 1* + equality of factor variances and covariance

between factors; *Model 1c*= *Model 1b* + equality of error variances. *Model 2*= *Model 1a* + equality of measurement intercepts.

5.4. Discussion

The present study examined the psychometric properties of the Italian adaptation of the STCI, which was designed to extend the utility of this measure to Italian speakers. The Italian version is an extension to the research conducted on the STCI, further validating the tool in Italian speakers. Items on the STCI-T60 demonstrated acceptable psychometric properties, as reflected on acceptable discrimination parameters and well-distributed items across the latent continuum allowing differentiation across levels of the measured trait.

Convergent and discriminant validity evidence was found for both the internal structure of the measure and its relationship to other variables. Test-retest reliabilities and alpha reliabilities were good to excellent following the *European Federation of Psychologists' Associations* (EFPA) guidelines (Evers et al., 2013), and similar to alpha values obtained in other published versions of the STCI in different languages (e.g., Carretero-Dios et al., 2014). Consistent with past research using the STCI (Ruch et al., 1996; Carretero-Dios et al., 2014) and Studies One, Two, and Three, the seriousness subscale in the English and the Italian version showed a lower alpha value compared to the other two subscales. This could be the result of the seriousness subscale capturing content more heterogeneous in nature.

Furthermore, the psychometric properties of the Italian version were compared to those of an English sample. Evidence from both samples demonstrated the English version and the Italian adaptation appeared to represent a reliable and structurally sound measure of the three-factor structure of cheerfulness, seriousness, and bad mood. Both the Italian and English factor structures provided a good model fit when evaluated

individually. The patterns of cross-cultural stability were supported by the multigroup analyses, which indicated the interrelationships of the STCI factors, and its respective facets demonstrated metric equivalence. Although the factor loadings were comparable, there were differences in intercepts across the groups. Given its benefits on psychological and physical well-being, the measure can be used for cross-cultural comparisons in correlational studies measuring the trait-like characteristics of cheerfulness, seriousness, and bad mood in humor interventions (e.g., Hofmann et al., 2015; Papousek and Schuler, 2005; Ruch et al., 2018).

All facets of personality correlated with the three subscales in the STCI in the expected directions. As expected, cheerfulness was correlated with higher extraversion and lower emotionality. Seriousness was correlated with higher conscientiousness, and bad mood was correlated with higher emotionality and lower extraversion. When examining the correlations between the STCI and related psychological concepts, cheerfulness was related to numerous variables associated with psychological well-being (e.g., higher general well-being, optimism), while bad mood was negatively associated with well-being (Chen et al., 2016; Tapia-Villanueva et al., 2014). In the present study, trait seriousness was found to be correlated with resiliency. Previous findings suggested trait seriousness showed negative correlations with indicators of well-being (e.g., happiness and sociability), and positive correlations with indicators of distress (e.g., depression and anxiety; Carretero-Dios et al., 2014). Similarly, state seriousness was positively correlated with state measures of distress, including negative affect, anger feelings, dysthymia, and anxiety (Lopez-Benitez et al., 2017). In the present sample, trait seriousness was positively associated with resiliency. When examining correlates of well-

being closely in the Chinese adaptation of the STCI, no correlations with past and present temporal levels of satisfaction with life were found with seriousness, but a small positive correlation with future temporal levels of satisfaction with life was found (Chen et al., 1997). Moreover, Study Three showed that trait seriousness was associated with well-being in a Chinese sample. Future research should investigate the role of seriousness in psychological well-being and whether it may interact with other personality traits to produce differential outcomes.

Some limitations of the present study should be addressed in future studies. First, the present study sampled undergraduate university students in a psychology class and their acquaintances and relatives. Undergraduate students and their personal connections represent a small portion of the Italian population and possibly represent a sample of individuals of higher socioeconomic status. It becomes important to examine the factor structure and the convergent and discriminant validity with the associations between other psychological constructs in diverse and heterogeneous samples (Clark & Watson, 1995). Second, test-retest reliability and completion of the HEXACO were established in two smaller subsamples that only included the undergraduate students. Although preliminary evidence for convergent-divergent validity was found in the STCI Italian version with personality measures and measures related to psychological well-being, future research should also seek to provide further support for this scale with humor-related constructs. Finally, the use of item parcels may confound various sources of construct-relevant and construct-irrelevant variance. Future studies should examine measurement invariance at the item level and the possibility of construct-relevant multidimensionality attributable to item psychometric complexity. Overall, the

psychometric validation of an Italian STCI would not only further the investigation on the fundamental conceptualization of the STCI across cultures, but also promote future assessment of the construct in psychological research and clinical practice in Italian speaking populations.

CHAPTER 6: Study Five

Title: The heart of humor: A network analysis of the temperamental basis of humor and humor personality traits⁶

6.1. Introduction

As Strelau (1996) proposed, temperament is characterized through individual differences in formal characteristics of behavior. In personality psychology, humor is defined as the cognition, behavior, and affect that constitute amusement, mirth, and exhilaration experienced by the individual and expressed to the surrounding environment (Ruch, Kohler, & van Thriel, 1996). Ruch and colleagues (1996) postulated interindividual differences that would predispose individuals to enjoy and engage in humor-related activities. The constructs measured in this model represent the temperamental basis of the sense of humor, as high trait cheerfulness predicts engagement in humor-related activities, but the frequency and intensity of engagement in these interactions are affected by traits seriousness and bad mood. Trait cheerfulness accounted for most of the variance in the sense of humor, while seriousness and bad mood also demonstrated incremental validity (Ruch & Carrell, 1998). Furthermore, Wagner and Ruch (2020) found unique variance in cheerfulness, seriousness, and bad mood that predicted frequency of humor behaviors and well-being above and beyond demographic variables and the five-factor model of personality. Specifically,

⁶ A version of this chapter has been submitted for publication.

cheerfulness and seriousness showed unique variance for humor behaviors and cheerfulness and bad mood showed unique variance for well-being (Wagner & Ruch, 2020).

While the temperamental basis of humor conceptualizes the predisposition of exhilaration, multidimensional trait-based humor models were developed to investigate differing personality styles of humor that predict appreciation, comprehension, and production in humor (Ruch, 2008). Some researchers proposed individual differences in humor styles may be adaptive or maladaptive with respect to the actor's subjective well-being (Martin, Puhlik-Doris, Larsen, Gray, and Weir, 2003). Martin et al. (2003) proposed two beneficial (i.e., self-enhancing, affiliative) and two detrimental (i.e., aggressive, self-defeating) styles of humor that promote well-being and increases interpersonal tension, respectively (Martin et al., 2003). Heintz et al. (2019) proposed two types of humor demonstrating structural validity across 22 countries: benevolent humor, which treats human weaknesses and wrongdoings compassionately, and corrective humor, which aims to better human weaknesses. Moreover, researchers have conceptualized differential expressions of humor as comic styles (e.g., fun, wit, irony, satire, cynicism), sense of humor variables (e.g., laughter, verbal humor), and factors of humor (e.g., social fun, mockery, humor ineptness; Heintz, 2019; Ruch & Heintz, 2018; Ruch, Heintz, Platt, Wagner, & Proyer, 2018). Ruch and Proyer (2008) proposed three dispositions toward ridicule and laughter, including gelotophobia (i.e., the fear of being laughed at), gelotophilia (i.e., the joy of being laughed at), and katagelasticism (i.e., the joy of laughing at others; Ruch & Proyer, 2008). Clearly, there is a movement towards

capturing a comprehensive psychological profile of humor in the form of multidimensional traits.

The temperamental basis of humor and aforementioned humor traits may be linked in conceptually sound ways to humor appreciation and creation. Affect, cognition, and behavior stimulate or inhibit each other within an ecosystem and structural covariance may indicate local interactions between assessed variables (Costantini et al., 2015). Martin et al. (2003) found that cheerfulness is positively associated with affiliative and self-enhancing humor and seriousness is negatively associated with affiliative humor and aggressive humor. Moreover, bad mood is negatively associated with affiliative humor and self-enhancing humor and positively associated with self-defeating humor (Martin et al., 2003). Using principal components analysis, Heintz (2019) revealed comic styles covered the affective components (i.e., cheerfulness, bad mood) of the temperamental basis of the sense of humor. In terms of humor traits, Heintz (2019) found large overlaps and redundancies between affiliative, self-enhancing, and aggressive, and fun, benevolent humor, and sarcasm, respectively. These results suggest some commonalities between these proposed models of humor traits. The limitation remains that it is unclear how the temperamental basis of humor interacts with specific styles of humor in a dynamic system.

Although these traits may reveal common and unique qualities in humor, the question of the core and interrelations of the humor-related traits remains unanswered. The present study aims to apply the network analysis approach to investigate the interplay of facet-to-facet interactions across the temperamental basis of humor along with humor traits as a network through a comprehensive, data-driven approach. The

latent trait model does not account for attitudes, cognitions, and behaviors that form an ecosystem in which specific characteristics associated with a trait may form excitatory or inhibitory relationships with other characteristics. Network analysis, which quantitatively provides the centrality of variables, provides a novel technique to allow structural covariation and direct association between elements in a model to occur, thus addressing the limitations of the common cause model (Costantini et al., 2015). Thus, it becomes imperative to explore the trait-by-trait interactions across the temperament basis of humor and humor traits.

6.2. Materials and Methods

6.2.1. Participants

Undergraduate students ($N=747$; 71.5% females) enrolled in a large university in Canada were recruited to participate in the study online using Qualtrics, a web-based survey tool. Most of the sample identified as European White ($n=316$; 42.3%) or Asian/Pacific Islander ($n=293$; 39.2%). Students' ages ranged from 17 to 54 years ($M=18.41$, $SD =2.01$). Participation in the study was voluntary for a credit towards a psychology course and participants provided informed consent and were debriefed. The study was approved by the Non-Medical Research Ethics Board at the University of Western Ontario prior to data collection.

6.2.2. Materials and Procedure

State-Trait Model of Cheerfulness – Trait Version. The international version of the State Trait Cheerfulness Inventory – Trait Version (STCI-T106; Ruch et al., 1996) measures three dimensions of cheerfulness, seriousness, and bad mood using 106 items. The measure consists of three factors of cheerfulness, seriousness, and bad mood.

Participants rated their level of agreement of each item using scales ranging from 1 (strongly disagree) to 4 (strongly agree). Each factor has subcategories (i.e., theoretical facets) that together are representative of the global latent trait (Ruch et al., 1996). For cheerfulness, the five theoretical facets include prevalence of cheerful mood (i.e., CH1), low threshold for smiling and laughter (i.e., CH2), composed view of adverse life circumstances (i.e., CH3), broad range of active elicitors of cheerfulness and smiling/laughter (i.e., CH4), and generally cheerful interaction style (i.e., CH5). For seriousness, the theoretical facets include prevalence of serious states (i.e., SE1), perception of even everyday happenings as important and taking it into consideration thoroughly and intensively (i.e., SE2), tendency to plan ahead and set long-range goals (i.e., SE3), tendency to prefer activities for which concrete, rational reasons can be produced (i.e., SE4), preference for a sober, object-oriented communication style (i.e., SE5), and “humorless” attitude about cheerfulness-related behaviors (i.e., SE6). For bad mood, the five theoretical facets include prevalence of bad mood (i.e., BM1), prevalence of sadness (i.e., BM2), response of sadness in cheerfulness-evoking stimuli (i.e., BM3), prevalence of ill-humoredness (i.e., BM4), and ill-humored behavior in cheerfulness-evoking stimuli (i.e., BM5). Previous findings demonstrated acceptable internal consistency, as well as factorial, convergent, and discriminant validity across versions of this measure were found (Ruch et al., 1996). While the STCI includes both trait and state versions, only the trait version was examined in this study.

Humor Styles Questionnaire. The Humor Styles Questionnaire (HSQ) measures two benign styles of self-enhancing and affiliative humor and two maladaptive styles of aggressive and self-defeating humor (Martin et al., 2003). Participants indicated their

agreement with each of the 32 statements on scales ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The HSQ demonstrated strong evidence of construct validity and has been used in more than 125 published studies in over 30 languages (Martin & Kuiper, 2016).

Four Dimensions of Humor Scale (4DHS). The 4DHS (Ruch 2012a; 2012b) is a 24-item measure that evaluates social fun, mockery, humor ineptness, and cognitive/reflective humor (Ruch 2012a; 2012b; Ruch & Heintz, 2019). Each item is evaluated on a seven-point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). The measure has demonstrated convergent and discriminant validity.

Comic Style Markers. The comic style markers questionnaire measures eight expressions of fun, humor, nonsense, wit, irony, satire, sarcasm, and cynicism using 48 items (Ruch et al., 2018). Each item is evaluated based on a seven-point Likert format (1= *strongly disagree* to 7= *strongly agree*). Ruch and colleagues (2018) indicated these markers can be characterized by laughing with another (e.g., lighter styles of fun, benevolent, nonsense), laughing at others (e.g., sarcasm, cynicism), and mixed styles (e.g., wit, irony, satire). This measure demonstrated strong reliability and structural and concurrent validity (Ruch et al., 2018).

Revised BenCor. The revised version of the BenCor is a 12-item measure that assesses benevolent and corrective humor using a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The internal consistency and construct validity of the BenCor were supported in several studies conducted in 22 different countries (Heintz et al. 2019).

Sense of Humor Questionnaire–Parallel Version. The sense of humor questionnaire (parallel version) is composed of 48 items measuring six humor skills (Ruch & Heintz, 2018). These six factors include enjoyment of humor, laughter, verbal humor, finding humor in everyday life, laughing at oneself, and humor under stress. The scale comprises of a seven-point Likert scale from 1= *strongly disagree* to 7= *strongly agree*. Research has demonstrated structural and concurrent validity for the measure (Ruch & Heintz, 2018).

PhoPhiKat-45. The PhoPhiKat-45 is a reliable and valid measure that assesses gelotophobia (i.e., the fear of being laughed at), gelotophilia (i.e., the joy of being laughed at), and katagelasticism (i.e., the joy of laughing at others; Ruch & Proyer, 2008). The measure has demonstrated strong reliability and structural, convergent, and discriminant validity (Ruch & Proyer, 2008).

6.2.3. Analytic strategy

Forbes et al. (2018) reported the replicability crisis in conditional independence networks may indicate measurement errors of single items that formulate the network. Thus, latent variables were integrated into the network analysis with each node representing a single facet that was theoretically derived by Ruch et al. (1996). For the STCI, each facet was presented as a separate node in the model. For humor trait measures, each latent variable was identified for each humor scale based on the factors identified in their original publication (i.e., each factor is a separate node in the model). Centrality measures (i.e., expected influence, strength, closeness, betweenness) and the signed version of Zhang's clustering coefficient for the EBICglasso network were examined to identify nodes that are important to the network structure (Costantini &

Perugini, 2016; Zhang & Horvath, 2005). The EBICglasso estimator (Extended Bayesian Information Criterion Graphical Least Absolute Shrinkage and Selection Operator) was used to conduct partial correlations between facets, in which small edge weights may shrink to zero to avoid the multiplicity problem with spurious correlations for a parsimonious network (Costantini et al., 2015; Epskamp, Borsboom, & Fried, 2018).

Based on Epskamp and colleagues' (2018) recommendations, the accuracy of edge-weights with bootstrapped confidence intervals was estimated. Furthermore, the stability of centrality indices was evaluated to inquire replicability and bootstrapped difference tests between edge-weights and centrality measurements were calculated for significance testing. Descriptive analyses were conducted using SPSS version 26. Estimates and plots from the network analysis were conducted on JASP version 0.10.2 and R packages bootnet, networkTools, and qgraph (Epskamp, Borsboom, & Fried, 2018; Epskamp et al., 2012).

6.3. Results

6.3.1. Network Estimation

Table 14 reports descriptive and reliability statistics. Figure 3 shows the visualization of the network model with strengths of the partial correlations characterized by 43 nodes. Of 903 possible edges, 283 (31.3%) were present with a sparsity value of .69. The small-worldness value was 1.28, reflecting no indication for small-world property (Humphries & Gurney, 2008). As expected, the partial correlations within traits for the STCI were generally stronger than the partial correlations between traits while other scales had their respective factors spread across the network. Based on Figure 3, cheerfulness is linked with lighthearted humor variables (e.g., laughter, humor under

stress, enjoyment of humor). Humorlessness (e.g., gelotophobia, self-defeating humor, inept) domains were clustered together in close proximity to bad mood and seriousness. Specifically, humor ineptness, gelotophobia, and self-defeating humor were associated with BM2 (i.e., prevalence of sadness) and SE6 (i.e., humorlessness attitude about cheerfulness-related behavior, roles, persons, stimuli, situations, and actions), which may constitute a cluster of humorlessness variables. Darker humor variables, which may constitute laughing at others (e.g., aggressive, mockery, sarcasm, satire, cynicism), were clustered together. All model output (i.e., bootstrapped edge-weights, centrality stability test, centrality difference test, items and subscales) are available in the Appendix H.

Table 14

Reliabilities, Descriptive Statistics, Skewness, and Kurtosis of the Temperamental Basis of Humor and Humor Trait Variables

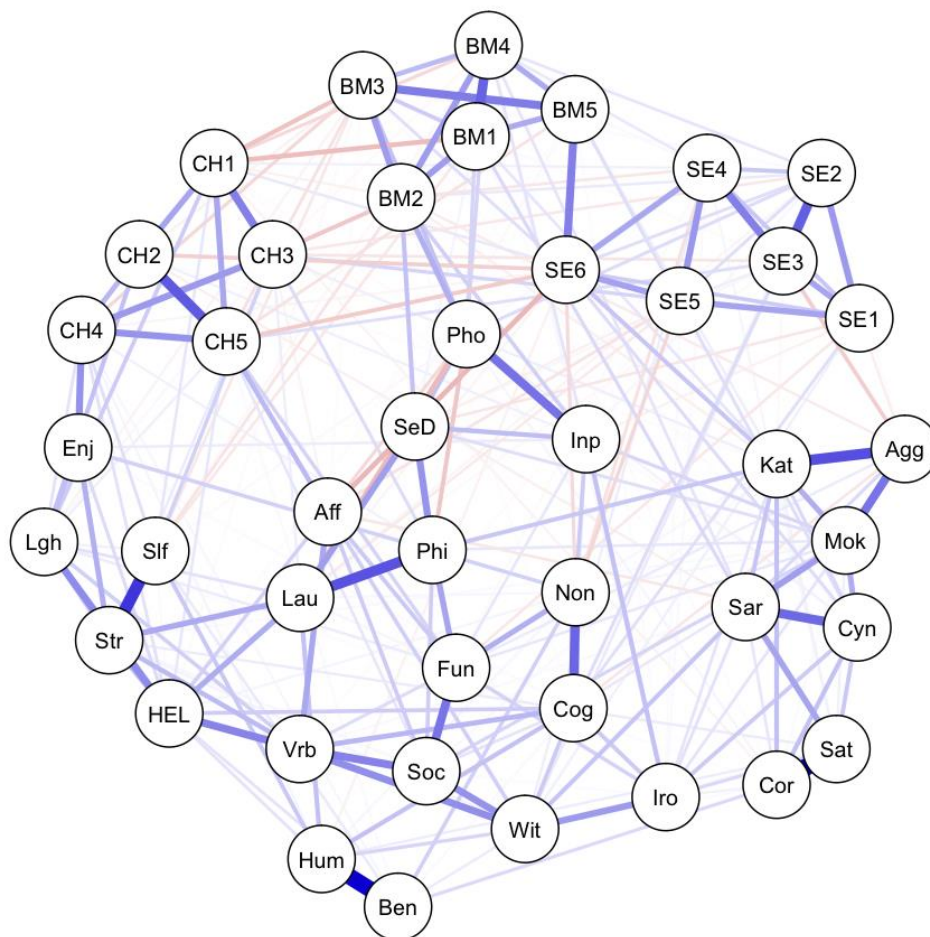
Variables	Description	Mean (SD)	Skewness	Kurtosis	Omega
CH1	Cheerful mood prevalence	2.88 (.56)	-.40	.18	.89
CH2	Smiling, laughter	3.29 (.51)	-.70	.22	.71
CH3	Composed view of adverse life circumstances	2.75 (.39)	-.24	.26	.64
CH4	Active elicitors of cheerfulness and smiling/laughter	3.11 (.41)	-.31	-.11	.68
CH5	Generally cheerful interaction style	3.35 (.44)	-.78	.46	.84
SE1	Prevalence of serious states	2.56 (.42)	.02	.07	.53
SE2	Everyday happenings as important	2.67 (.43)	.15	.39	.67
SE3	Plan ahead and set long-range goals	2.97 (.51)	-.34	.11	.75
SE4	Tendency to prefer activities for which	2.29 (.49)	.19	.40	.54

	concrete, rational reasons can be produced				
SE5	Preference for a sober, object-oriented communication style	2.46 (.43)	.03	.20	.55
SE6	Humorlessness attitude about cheerfulness-related behavior, roles, persons, stimuli, situations, and actions	1.84 (.50)	.41	-.11	.70
BM1	Prevalence of bad mood	2.17 (.53)	.27	.06	.72
BM2	Prevalence of sadness	2.42 (.59)	.10	-.22	.83
BM3	Sad and Ill-humored behavior in cheerfulness evoking situations, the attitudes toward such situations and the objects, persons, and roles involved	1.97 (.58)	.41	-.30	.73
BM4	Prevalence of ill-humoredness	2.27 (.56)	.30	-.06	.78
BM5	ill-humored individual's behavior in cheerfulness evoking situations	1.97 (.55)	.42	-.07	.67
Pho	Gelotophobia	2.32 (.47)	.07	-.23	.83
Phi	Gelotophilia	2.55 (.49)	.03	-.05	.85
Kat	Katagelasticism	2.17 (.47)	.18	-.10	.84
Ben	Benevolent Humor	5.12 (.79)	-.50	.58	.67
Cor	Corrective Humor	4.09 (1.04)	-.21	-.07	.77
Fun	Fun	4.93 (1.06)	-.50	.04	.80
Iro	Irony	4.63 (.97)	-.23	-.19	.74
Wit	Wit	4.86 (.99)	-.33	-.06	.83
Sar	Sarcasm	3.75 (1.05)	.09	-.19	.78
Hum	Humor	5.05 (.84)	-.25	-.13	.72
Sat	Satire	4.12 (1.08)	-.14	-.14	.82
Non	Nonsense	5.09 (.96)	-.42	.08	.80
Cyn	Cynicism	3.82 (.97)	.08	.16	.75
Soc	Social Fun	4.63 (.99)	-.29	<.01	.76
Mok	Mockery	3.80 (1.07)	.14	-.29	.76
Inp	Humor Ineptness	4.09 (.81)	-.18	.03	.45
Cog	Cognitive/Reflective Humor	4.95 (.77)	-.31	.48	.63
Enj	Enjoyment of Humor	4.94 (.90)	-.37	.17	.74
Lgh	Laughter	4.95 (.88)	-.23	-.04	.74
Vrb	Verbal Humor	5.11 (.95)	-.42	<.01	.87

HEL	Finding Humor in Everyday Life	5.32 (.89)	-.61	.30	.88
Lau	Laughing at the Self	4.89 (1.04)	-.54	.40	.86
Str	Humor Under Stress	4.78 (1.09)	-.38	-.23	.90
Aff	Affiliative Humor	4.01 (.60)	-.70	.31	.81
Slf	Self-Enhancing Humor	3.39 (.63)	-.36	.02	.77
Agg	Aggressive Humor	2.74 (.62)	.08	.33	.70
SeD	Self-Defeating Humor	3.04 (.72)	-.01	-.19	.80

*All standard deviation values are: .09 for Skewness, .18 for Kurtosis.

Figure 3

EBICglasso Network Graph

Note. $N=747$. The network structure is a Gaussian graphical model with partial correlation coefficients. The nodes represent personality traits and the edges represent the EBICglasso partial correlations between them. Thicker edges represent stronger associations, with blue edges representing positive associations and red edges representing negative associations. Abbreviations found in Table 14.

6.3.2. Centrality Indices and Network Stability

Table 15 shows the centrality and clustering values based on the network. Centrality difference analyses regarding the strength (Appendix H) has shown that SE6 (i.e., humorlessness attitude about cheerfulness-related variables), CH5 (i.e., generally cheerful interaction style), verbal humor, laughter, katagelasticism, humor in everyday life, BM2 (i.e., prevalence of sadness), and gelotophobia demonstrated the greatest strength in the network. These variables did not differ significantly from the variable of the greatest strength (i.e., SE6) and showed significantly higher strength compared to other facets in the network. With numerous negative edges within the model, expected influence (EI) was calculated to account for negative associations (Robinaugh, Millner, & McNally, 2016). Based on EI, satire, humor, social fun, sarcasm, wit, katagelasticism, humor under stress, humor in everyday life, mockery, and verbal humor had a *z*-score above one. Highest Zhang clustering coefficient values in CH2, SE1, and BM4 suggest that this scale may be redundant and capturing information by other facets (Zhang & Horvath, 2005). The CS-coefficient was .75 for strength, edge weight, and expected influence, suggesting that centrality indices were highly stable.

Table 15

Centrality and Clustering Measures for Network Analysis

Variable	Betweenness	Closeness	Strength	EI	Zhang
CH1	-.08	-.33	.82	-1.54	-0.28
CH2	-.94	-.39	-1.14	-.97	1.76
CH3	-.32	-.38	-.55	-1.22	-1.53
CH4	-.39	-.59	.12	.33	-.38
CH5	.26	.30	1.52	.22	-.20
SE1	-1.11	-1.70	-.93	-.74	1.54
SE2	-1.04	-1.83	-.69	.02	1.34
SE3	.05	-1.01	.10	-.51	.33
SE4	-.60	-.77	-.14	-.02	.75
SE5	-.87	-.19	-.67	-1.03	.39
SE6	3.90	1.99	2.29	-1.40	-1.08
BM1	-.15	-.08	.38	-.24	1.38
BM2	.05	.07	1.01	-.80	.32
BM3	-.05	.33	.68	-1.44	.55
BM4	-1.22	-.59	.44	.49	1.68
BM5	.88	.69	-.39	.16	.51
Pho	1.15	1.20	.90	-1.03	-.11
Phi	1.12	1.79	.41	.36	-.05
Kat	1.77	.62	1.15	1.29	-.20
Ben	-.94	-1.41	-1.45	.11	-1.11
Cor	-.39	-1.71	-.38	.52	.11
Fun	-.08	1.05	.50	.88	-1.15
Iro	-.77	-.42	-1.46	.11	-.97
Wit	.60	.73	.39	1.23	-.30
Sar	.64	-.31	.73	1.17	.60
Hum	-.08	-.91	.36	1.01	-1.80
Sat	-.67	-1.82	.01	1.00	.43

Non	-.22	.49	-.72	-1.11	-2.04
Cyn	-1.04	-.95	-.39	.32	1.21
Soc	-.70	.62	.13	1.07	.80
Mok	-.56	-.66	.80	1.48	.63
Inp	-.46	.31	-.70	.37	-1.02
Cog	-.08	.33	.51	.93	-1.30
Enj	-.50	-.65	-2.89	-.75	-.71
Lgh	-.63	-.13	-.93	.21	.31
Vrb	1.94	1.79	1.39	1.78	.59
HEL	.16	1.18	1.03	1.46	-.22
Lau	1.60	1.44	1.23	-.16	-.57
Str	.60	.29	.65	1.39	-1.20
Aff	.67	1.60	-.71	-2.18	-.23
Slf	-.67	-.40	-1.16	-.94	-1.31
Agg	.09	-.15	-1.04	-1.40	1.01
SeD	-.91	.57	-1.21	-.44	1.53

Note. Values are presented as z -scores. EI = Expected Influence. Zhang = Zhang's clustering coefficient. Abbreviations found in Table 14.

6.4. Conclusions

The present study was the first to investigate the network structure of the temperamental basis of humor and humorous personality traits. Several interesting findings emerged in this study. First, the temperamental basis of humor is postulated as a multidimensional model that represents disposition to humor and laughter along with humorlessness. The network model showed cheerfulness, seriousness, and bad mood were largely interconnected to humor-related traits, further providing evidence for the criterion validity of the temperamental basis of humor model (Ruch & Hofmann, 2012). Moreover, seriousness and bad mood were linked with variables related to humorlessness and SE6 had the highest centrality measures across strength, betweenness, and closeness.

These findings support Ruch and Colleagues' (1996) theoretical model that humorlessness should be well-represented in the temperamental basis of humor.

Second, the CS-coefficient was above .50, suggesting an accurate and stable network in which centrality indices were highly stable. Third, bootstrapped difference tests were conducted to evaluate central and peripheral traits within the network. The nodes SE6 (i.e., humorlessness in cheerful evoking situations), CH5 (i.e., cheerful interaction style), verbal humor, laughter, katagelasticism, humor in everyday life, BM2 (i.e., prevalence of sadness), and gelotophobia were strength central personality traits that may affect other humor characteristics directly. These traits represent the temperamental basis of humor and meaningful components that emerge visually in the network. Using principal components analyses, Heintz (2019) found two components of lighter comic styles with cheerfulness and darker comic styles with wit and bad mood. As Ruch et al. (2018) proposed, it appears traits regarding laughing with others (e.g., fun, laughter, enjoyment of humor), laughing at others (e.g., aggressive humor, mockery), and mixed styles (e.g., wit, cognitive humor, irony) emerged within the network.

This study has several limitations. First, most participants were undergraduate students recruited from an academic institution in Canada. Results may not be generalizable to other samples across different age groups and cultures. Second, network estimates may be affected by the high proportion of females in the sample. Hofmann, Platt, Lau, and Torins-Marin (2020) concluded in a systematic review that there are sources of gender differences in humor appreciation and production. Future studies should examine potential gender differences. Lastly, future studies should assess self-reported humor traits, as well as peer-report or effectiveness of humor production rated

by blind judges. These results would provide a more comprehensive profile in humor traits both from self-report and peer-report sources.

Overall, the present study applied a network analysis approach to investigate the structure and interplay of facet-to-facet interactions across the temperamental basis of humor and humor traits through a comprehensive and data-driven approach. This work can provide implications for further investigations in the theoretical model and nomological network of temperament and humor trait constructs.

CHAPTER 7: Study Six

Title: Cheerfulness and life satisfaction mediated by self-esteem and behavioral activation: A serial mediation model⁷

7.1. Introduction

Cheerfulness is defined as a high prevalence of cheerful mood, the tendency to laugh easily and frequently (i.e., hilarity), a cheerful interaction style, and robust cheerful mood across different circumstances (Ruch, Köhler, & van Thriel 1996). A positive disposition and cheerful affect may be self-fulfilling, leading cheerful individuals to experience more positive events and fulfilling social relationships, which can further enhance well-being (Headey & Wearing, 1989). As expected, traits and dispositions of cheerfulness are largely associated with life satisfaction (Ruch & Hofmann, 2012).

Robust findings in the literature have shown positive affect and more positive, lighthearted uses of humor are associated with self-esteem (e.g., Bajaj, Hupta, & Pnade 2016). Trait cheerfulness could predict more positive and healthy views of the self through employing a cheerful equanimity and carefree appraisal of events (Ruch & Hofmann, 2012). In fact, trait cheerfulness is not only associated with a positive attention bias, but also with emotional regulatory processes (López-Benítez et al., 2018; Papousek & Schulter 2010). Hence, increased cheerfulness may enhance and help maintain positive self-esteem, defined as the positive perception of one's own emotional self-worth and value, when encountering external stimuli that may threaten the way one views the self.

⁷ A version of this chapter has been published. Lau, C., Chiesi, F., Ruch, W., & Saklofske, D.H. (2020). Is cheerfulness and satisfaction with life mediated by self-esteem and behavioral activation? A serial mediation model. Advance online publication in *Personality and Individual Differences*.

Previous research established self-esteem as one of the most important predictors in affective and cognitive well-being (e.g., Schimmack & Diener 2003). The association between self-esteem and life satisfaction is shown to be closely linked with a sense of agency, mastery, and control over one's environment, and it is also highly correlated with optimism and lack of hopelessness (Erol & Orth 2011; Lucas et al. 1996). These findings suggest cheerfulness could allow individuals to experience positive affect and cognition that promote greater self-esteem.

To date, no study has investigated the role of self-esteem and behavioral activation in the trait cheerfulness and well-being association. Given that behavioral activation, defined as the degree to which an individual is proactive towards engagement in rewarding behavior, is a strong component of cognitive behavioral interventions, implementations of such interventions may indirectly promote behavioral activation through the enhancement of cheerfulness (Ruch and Hofmann, 2017). Moreover, cheerfulness-enhancing practices may also enhance self-esteem, which robust findings have suggested enhances well-being and acts as a protector against stress (Bajaj, Gupta, and Pande, 2016). Increased positive affect and a cheerful interactive disposition may then buffer negative effects of critical thoughts, leading to greater behavioral activation. These findings posit the possible link between trait cheerfulness and life satisfaction as a result of emotional and behavioral regulation strategies, including behavioral activation and preserved self-esteem through better coping (López-Benítez et al., 2018; Papousek and Schulter 2010; Ruch and Hofmann 2012). Depressed patients had lower state and trait cheerfulness compared to healthy control groups, suggesting trait cheerfulness to be associated with enhanced life satisfaction and decreased depressive symptoms

(Falkenberg, Jarmuzek, Bartels, & Wild, 2011). Hence, behavioral activation could be promoted through a cheerful style of interaction and disposition, which could increase contact with positive reinforcing events through engaging behaviors (Ekers et al. 2014). Implications of the present study for clinical practice may enhance greater awareness of the mechanisms through which trait cheerfulness may have its effects.

The purpose of the present study was to establish a path model to determine whether self-esteem and behavioral activation, independently and serially, would mediate the association between cheerfulness and SWL. It is predicted that trait cheerfulness is associated with self-esteem, which in turn is expected to be related to behavioral activation in predicting greater SWL.

7.2. Methods

7.2.1. Participants and Procedure

A total of 392 undergraduate students (65.5% females) from the University of Western Ontario completed a battery of online questionnaires following informed consent. Participants were debriefed upon completion of the study. Students' ages ranged from 16 to 36 years ($M = 19.05$, $SD = 1.80$). The study was approved by the Non-Medical Research Ethics Board at the University of Western Ontario prior to data collection.

7.2.2. Measures

Cheerfulness. The State Trait Cheerfulness Inventory – Cheerfulness subscale measures a high prevalence of cheerful mood, low threshold for smiling and laughter, composed view of adverse life circumstances, broad range elicitors of cheerfulness and smiling and laughter, and generally cheerful interaction style (Ruch et al. 1996). The subscale consists of 20 items (e.g., “I am a cheerful person”) measured on a four-point Likert-style scale

(1=*strongly disagree*; 4= *strongly agree*). Previous research has established this trait measure shows construct, structural, and predictive validity (Ruch et al., 1996). While the STCI includes both trait and state versions, only the trait version was examined in this study.

Self-Esteem. The Rosenberg Self-Esteem Scale measures an individual's own emotional self-worth and value (Rosenberg, 1965). Participants rated ten items (e.g., "on the whole, I am satisfied with myself") on a four-point Likert scale (1 =*strongly disagree*, 4=*strongly agree*). This measure demonstrated evidence of strong internal consistency and test-retest reliability, as well as structural, convergent, and discriminant validity (Gray-Little, Williams, & Hancock, 1997).

Behavioral Activation. The short form of the Behavioral Activation for Depression Scale (BADSD) measures the degree to which an individual engages in activities that help them achieve their specific goals and connect with positive reinforcement in their environment using nine items (e.g., "I engaged in many different activities"; Kanter, Mulick, Busch, Berlin, & Martell, 2012). Previous research demonstrated strong internal consistency and construct and predictive validity (Kanter et al., 2012).

Life Satisfaction. The Satisfaction with Life Scale (SWLS; Lucas, Diener, & Suh, 1996) measures the subjective evaluation of overall quality of life using a seven-point scale and five items (e.g., "I am satisfied with my life") ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

7.2.3. Data Management and Analysis

All analyses were conducted on SPSS version 23 and PROCESS plug-in version 2.16.3 for mediation effects analysis (Hayes, 2013). Following recommendations of

Preacher and Hayes (2004) and Hayes (2013), a serial mediation effect analysis utilizing the Bootstrap method (sample size = 5000) was conducted. The data were screened for normality, linearity, homogeneity, and homoscedasticity. Data were also screened for multivariate outliers with Mahalanobis distance, which is the distance of a case from the centroid of other cases (i.e., grand mean). In the chi-square distributions, with four degrees of freedom, the associated cut-off value was 18.47 ($p < .001$). Schoemann and colleague's (2017) algorithm was conducted to estimate sample size and statistical power for complex path analytic models with indirect effects using Monte Carlo simulations. Findings showed all paths ranged in values of .88 to 1.00 of power when using $N = 391$, 1,000 number of replications, 2000 Monte Carlo draws per replication, and confidence interval level of 95%. Specifically, the cheerfulness \rightarrow behavioral activation \rightarrow SWL path showed a power value of .88, the cheerfulness \rightarrow self-esteem \rightarrow behavioral activation \rightarrow SWL path showed a power value of 1.00, and the cheerfulness \rightarrow self-esteem \rightarrow SWL path showed a power value of 1.00. Detection of multivariate outliers through squared Mahalanobis distance led to the deletion of one case. The effect sizes were calculated for indirect effects using percent mediation (P_M), which is interpreted as the percent of total effect accounted for by the indirect effects (Preacher and Kelley, 2011). The Bootstrap analysis sample size was 5000 and the mediation effect test is significant when it does not contain zero under the 95% confidence interval.

7.3. Results

Descriptive statistics, Cronbach's alpha, and zero-order correlations of the study variables were computed (Table 16). No significant deviations concerning linearity,

homogeneity, and homoscedasticity were observed. Zero order correlation analyses showed cheerfulness was positively associated with all variables.

Table 16

Descriptive Statistics and Zero-order Correlations of the Study Variables

Variable	1	2	3	4
1. Cheerfulness	<i>.91</i>			
2. Self Esteem	.45*	.89		
3. Behavioral Activation	.38*	.60*	.77	
4. Satisfaction with Life	.41*	.65*	.57*	.86
Mean	3.12	2.92	4.30	4.81
<i>SD</i>	.45	.61	.92	1.30

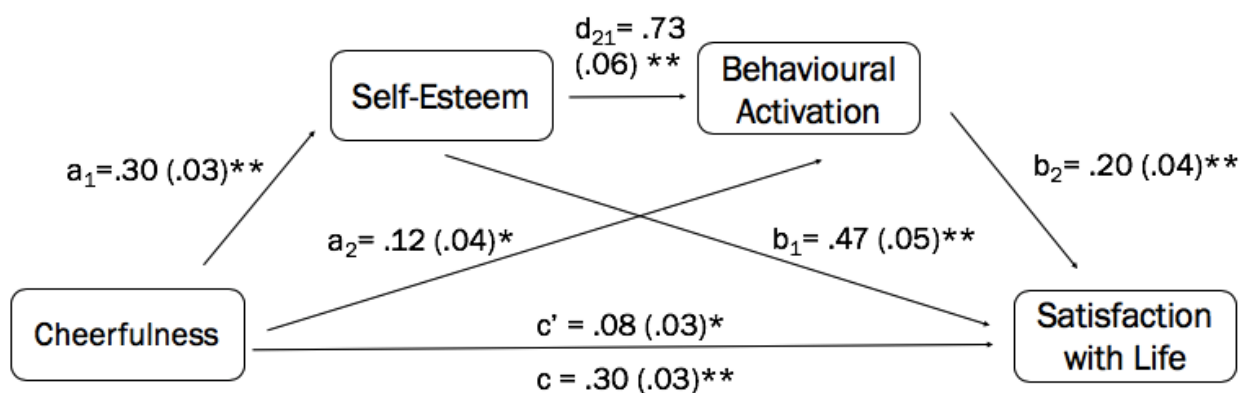
Note. $N = 391$. Cronbach alphas in diagonal are in *italics*. * $p < .001$

7.3.1. Double Mediation Effect Analysis

A double mediation effect model was tested in which self-esteem and behavioral activation were mediators, trait cheerfulness was the predictor, and SWL was the outcome (Figure 4). The total amount of variance accounted for by the overall model was 48.4%. The total effect of cheerfulness on SWL was significant, $b = .30$, $t(387) = 8.90$, $p < .001$. The direct effect of cheerfulness on SWL was also significant ($b = .08$, $t[387] = 2.77$, $p < .01$). Cheerfulness significantly predicted self-esteem ($b = .30$, $t[389] = 9.88$, $p < .001$) and behavioral activation ($b = .12$, $t(388) = 2.97$, $p < .01$). Self-esteem also predicted behavioral activation ($b = .73$, $t[388] = 11.95$, $p < .001$). As expected, both self-esteem ($b = .47$, $t[387] = 9.34$, $p < .001$) and behavioral activation ($b = .20$, $t[387] = 5.59$, $p < .001$) predicted SWL.

Figure 4

Analysis Diagram of Mediation Effect of Self-Esteem and Behavioral Activation in the Model Simultaneously and Operating in Sequence



Note. Regression/path coefficients are all in unstandardized form and standard errors are given in parentheses. Symbol c' represents direct effect of cheerfulness on SWL and c represents total effect of cheerfulness on SWL. Asterisks indicate significant coefficients (* represents $p < .01$; ** represents $p < .001$).

A serial mediation model allows the isolation of the indirect effects of behavioral activation and self-esteem. All three regression coefficient estimates and hypothesized indirect effects based on the use of 95 percent bias corrected bootstrapped confidence intervals (BCa CI) were significant: (1) cheerfulness → self-esteem → SWL ($b = .14$, $SE = .02$, 95% BCa CI = [.11, .19], $P_M = .49$), (2) cheerfulness → self-esteem → behavioral activation → SWL ($b = .04$, $SE = .01$, 95% CI = [.03, .07], $P_M = .15$), and (3) cheerfulness → behavioral activation → SWL ($b = .02$, $Boot SE = .01$, 95% CI = [.01, .05], $P_M = .08$).

These results suggest that all paths are significant and the first, second, and third indirect effects account for roughly 49%, 15%, and 8% of the total effect, respectively.

Pairwise comparisons between the three indirect effects on the cheerfulness-SWL association were conducted to compare the strengths of these associations. Overall findings suggest that the indirect effect of cheerfulness on SWL through self-esteem was significantly greater than the serial mediating effect, $b = .10$, $SE = .02$, 95 % CI = [.06, .15], and the indirect effect through behavioral activation, $b = .12$, $SE = .02$, 95 % CI = [.08, .17]. The pairwise comparison between the serial mediating effect and the indirect effect through behavioral activation was not statistically significant.

7.4. Discussion

This present study investigated whether self-esteem and behavioral activation, which previous literature established as important variables related to psychological well-being, mediated the association between cheerfulness and life satisfaction in a sample of Canadian undergraduate students. While the mediating effect of the two mediators is partial, complete mediation is only to be expected when effects are small, as associations between psychological variables are often accompanied with a large number of mediators (Preacher & Kelley, 2011). These present findings in the double mediation model suggest that trait cheerfulness is associated with greater SWL, part of which is mediated by greater self-esteem and behavioral activation independently. Moreover, the serial mediation is also significant, suggesting that trait cheerfulness is associated with greater self-esteem, and that self-esteem subsequently enables behavioral activation (i.e., an individual to engage in rewarding activities), thus predicting SWL.

Studying the joint manifestation of cheerfulness and key variables related to well-being can have implications on the treatment literature (Ruch & Hofmann, 2017). Depressive symptoms were alleviated and greater life satisfaction were found through enhancing trait and state cheerfulness during interventions (e.g., Falkenberg, Buchkremer, Bartels, and Wild, 2011; Ruch & Hofmann, 2017). The present results indicated that cheerfulness may affect self-esteem, as a cognitive component, and activation of rewarding behaviors, as a behavioral component. These results are also consistent with recent findings that demonstrate the importance of extraversion and well-being as attributed to energy level as opposed to global trait extraversion (Margolis, Stapley, & Lyubomirsky, 2019).

This study has some limitations. The present study utilized a cross-sectional design and future studies could employ longitudinal designs and conduct structural equation models to investigate the directionality between the study variables. Second, group differences were not examined, and future studies should test the invariance of the mediation model across gender and age. Finally, the sample only included undergraduate students and future studies should examine the generalizability of these findings. Despite these limitations, these findings provide new insight into the associations between cheerfulness and SWL that may advance a coherent and multifaceted theoretical framework on the pathways in which well-being may be achieved through cheerfulness.

CHAPTER 8: Study Seven

Title: The combinative role of traits cheerfulness and seriousness relating to resiliency and well-being: A moderated mediation model⁸

8.1. Introduction

Cheerfulness is broadly defined as an individual's habitual tendencies in presenting cheerful mood, laughing and smiling frequently and easily, and possessing a cheerful presentation and composure both alone and in social interactions (Ruch, Köhler, and van Thriel, 1996; 1997). Ruch et al. (1996) proposed that cheerfulness is related to the disposition for amusement and readiness for eliciting laughter and feelings of positive emotion. Indeed, high trait cheerfulness is associated with more positive emotions and less negative emotions when managing emotional events, such that cheerfulness is related to a greater permeability to the affective environment (López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2018; Ruch and Hofmann 2012).

Ruch and colleagues (1996) further proposed that seriousness is an important trait in suppressing positive affect and laughter. Proyer & Rodden (2013) found that seriousness alone was associated with low playfulness, but the presence of both high cheerfulness and high seriousness within individuals was associated with high playfulness scores. Proyer and Rodden (2013) proposed that individuals with high levels of cheerfulness and seriousness could reflect an active and energetic yet responsible and objective disposition. The large majority of research has investigated the benefits of

⁸ A version of this manuscript has been published. Lau, C., Chiesi, F., Ruch, W., & Saklofske, D.H. (2020). Is cheerfulness and satisfaction with life mediated by self-esteem and behavioral activation? A serial mediation model. Advance online publication in *Personality and Individual Differences*.

cheerfulness in isolation and little attention has been given to trait seriousness and its effects on cheerfulness. Furthermore, the psychosocial outcomes of seriousness are few and mixed. Zero-order correlations showed state seriousness is associated with bad mood, negative affect, anger feelings, and dysthymia while trait seriousness is associated with trait bad mood and negatively associated with happiness and sociability (Carretero-Dios et al., 2013; López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2017). In fact, depressed patients reported lower cheerfulness and higher seriousness compared to healthy controls, suggesting the psychosocial benefits of high cheerfulness and low seriousness (Falkenberg, Jarmuzel, Bartels, & Wild, 2011). In contrast with the aforementioned findings, greater trait seriousness is associated with satisfaction with life in Study Three and less risky behaviors in specific contexts (Edwards, 2012). Given robust findings on the physical and psychosocial benefits of trait cheerfulness (see Ruch & Hofmann, 2012 for a review), trait seriousness and cheerfulness should be investigated collectively to produce a more comprehensive profile in their associations with resiliency and well-being.

Extending Proyer and Rodden's (2013) work, the present study tested a moderated mediation model in which seriousness moderates the association between cheerfulness with resiliency which is associated with greater well-being. Given that cheerfulness is associated with better emotional management, it is hypothesized that cheerfulness is associated with greater resiliency and well-being regardless of the levels of seriousness (Yip & Martin, 2006). It is also hypothesized that for those low in cheerfulness, seriousness is associated with greater well-being given that rational thinking and the tendency to plan ahead could prevent individuals from engaging in

wellness-compromising behaviours (Edwards, 2012). Consistent with the available evidence, an integral model including seriousness was created with the following hypotheses:

Hypothesis 1. Cheerfulness would indirectly be associated to subjective well-being through resiliency. Specifically, cheerfulness is related to greater resiliency, which in turn is associated with greater SWB.

Hypothesis 2. Seriousness would moderate the mediating effect of resiliency in the association between cheerfulness and SWB. Specifically, different combinations of traits cheerfulness and seriousness should have distinct effects on resiliency.

8.2. Methods

8.2.1. Participants and Procedure

Undergraduate students and their family and acquaintances from a large university in central Italy were invited to participate in the study. The sample comprised of 646 participants (54.8% female, age range from 18 to 60 years, $M=32.38$, $SD=14.86$) and 345 (53.4%) participants were undergraduate students. Participants gave informed consent and participated voluntarily.

8.2.2. Measures

Cheerfulness. The cheerfulness subscale in the State Trait Cheerfulness Inventory – Trait Version (STCI-T60; Ruch, Köhler, & van Thriel, 1996) is a 60-item, self-report questionnaire capturing attitudinal and cognitive aspects of cheerfulness assessed using a four-point Likert-style scale (1=*strongly disagree* to 4= *strongly agree*). The cheerfulness measure demonstrated strong internal consistency, structural, convergent and

discriminant validity (Ruch et al., 1996). While the STCI includes both trait and state versions, only the trait version was examined in this study.

Seriousness. The seriousness subscale in the STCI-T60 consists of 20 items that measure seriousness using a four-point Likert-style scale (1=*strongly disagree* to 4=*strongly agree*; Ruch et al., 1996). Seriousness is conceptually defined as a high prevalence of serious states, perception of everyday happenings as important, preference for sober communication, tendency to plan ahead, and tendency to set long term goals. Previous research has found strong internal consistency, structural, and predictive validity for this subscale (Carretero-Dios et al., 2014; Ruch et al, 1996).

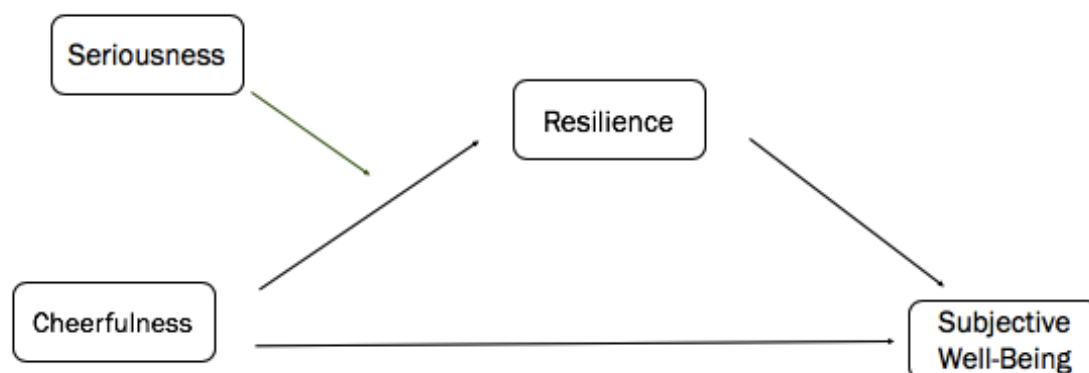
Resilience. The Italian version of the Connor-Davidson Resilience Scale (CD-RISC-10) is a 10-item questionnaire that assesses resiliency as the mechanism to adapt and thrive when under adversity (Connor & Davidson, 2003). Respondents used a five-point Likert scale for each item (0= *never* to 4= *almost always*). Previous research demonstrated the reliability, structural, and concurrent validity for the Italian version (Di Fabio & Palazzeschi, 2012).

Well-Being. The Italian version of the World Health Organization Well-Being Index (WHO-5) is a five-item measure intended to assess subjective well-being that has been translated in over 30 languages with evidence of reliability and construct validity (Heun, Bonsignore, Barkow, & Jessen, 2001; Italian version: Nicolucci et al., 2004). Respondents rated each statement according to a six-point Likert-style scale (from 0 = *at no time* to 5= *all of the time*). Previous research has shown good construct validity as a unidimensional scale measuring well-being in younger and older adults (Topp et al., 2015).

8.2.3. Data Analysis

In the current sample, item means were calculated and reliability indices of the employed scales ranged from adequate to excellent (Table 17). As seen in Figure 5, a moderating effect and moderated mediating effect in a single model was constructed to analyze the mechanism underlying the association between cheerfulness, seriousness, resilience, and subjective well-being using the PROCESS plug-in for SPSS (Hayes, 2016). Prior to the analysis, data were screened based on assumptions of linearity, normality, homoscedasticity, and absence of multicollinearity. Data was screened for univariate outliers with Mahalanobis distance, the distance of a case from the centroid of other cases (i.e., grand mean), and four outliers were deleted. Results did not differ when age and gender were added as covariates to the model. Thus, results are presented without control variables as patterns of results remained consistent in the models including or excluding control variables (Bernerth & Aguinis, 2016; O'Neill, McLarnon, Schneider, & Gardner, 2014). The final sample included in the analysis consists of 642 participants.

Figure 5

Moderated Mediation Model

Note. Visualization of the model predicting subjective well-being with seriousness as a moderator and resilience as the mediator between cheerfulness and subjective well-being.

Bootstrapping procedures were employed using a robust analysis to test indirect effects between predictor and outcome using mediators (Mooney and Duval 1993; Shrout & Bolger 2002). The mediation effect test is significant when the interval does not include zero under the 95% confidence interval (Preacher & Hayes 2008).

8.3. Results

The zero-order correlations did not deviate from expectations (Table 17). Results from the moderated-mediation model (Table 18) revealed that the association between cheerfulness and well-being was mediated by resilience. Supporting hypothesis one, the unstandardized regression coefficient between cheerfulness and well-being was statistically significant ($b = .56, SE=.07, t[638] = 8.05, p < .001$), as was that between

resiliency and well-being ($b = .34$, $SE=.05$, $t[638] = 6.39$, $p < .001$). Supporting hypothesis two, the index of moderated mediation (IMM) with 95% bias-corrected confidence intervals (CIs) using 1000 bootstrapped samples excludes zero (IMM = $-.12$, $SE = .04$; bootCI: $-.22$, $-.05$), corresponding to evidence supporting moderated mediation. The mediating effect of cheerfulness on resilience differentiated upon distinctive values of seriousness (i.e., the interaction was significant; $b = -.37$; $SE = .11$, $t[638] = -3.33$, $p < .001$). The interaction was probed through testing the conditional effects of resiliency at three levels of seriousness (i.e., Mean \pm 1 SD). The association between cheerfulness and resilience was slightly stronger at low levels of seriousness ($b = .27$, $SE=.05$, 95% BCa CI = $[.18, .37]$) than at average levels ($b=.22$, $SE=.04$, 95% BCa CI = $[.15, .29]$) and at high levels ($b=.17$, $SE=.03$, 95% BCa CI = $[.11, .24]$).

Table 17

Summary Statistics and Zero-Order Correlations among Variables

	M	SD	(1)	(2)	(3)	(4)
(1) Cheerfulness	2.92	.54	<i>.93</i>			
(2) Seriousness	2.91	.40	-.00	<i>.79</i>		
(3) Resilience	2.46	.69	.48**	.25**	<i>.86</i>	
(4) Well-Being	2.73	.91	.46**	.10*	.42**	<i>.82</i>

Note. $N = 642$. MacDonal's Omega values in diagonal are in italics. *Significant at the .05 level (two-tailed) **Significant at the .01 level (two-tailed).

Table 18

Moderated Mediation Model with Subjective Well-Being as the Outcome

	β	<i>SE</i>	LLCI	ULCI
Mediator variable model (Resiliency)				
Constant	3.46	.02	3.41	3.51
Cheerfulness	.65	.05	.55	.74
Seriousness	.43	.06	.32	.54
Cheerfulness x Seriousness	-.37	.11	-.58	-.15
Dependent Variable Model (SWB)				
Constant	2.56	.18	2.20	2.92
Resilience	.34	.05	.24	.44
Cheerfulness	.56	.07	.43	.70
Conditional direct effect analysis				
Mediator	B	Boot SE	BootLLCI	BootULCI
Low Seriousness (<i>M</i> – 1 <i>SD</i>)	.27	.05	.18	.37
Average Seriousness (<i>M</i>)	.22	.04	.15	.29
High Seriousness (<i>M</i> + 1 <i>SD</i>)	.17	.03	.11	.24

Note. Unstandardized regression coefficients were reported. SWB= subjective well-

being. Bootstrap sample size = 1000. LL = lower limit, CI= confidence interval, UL=

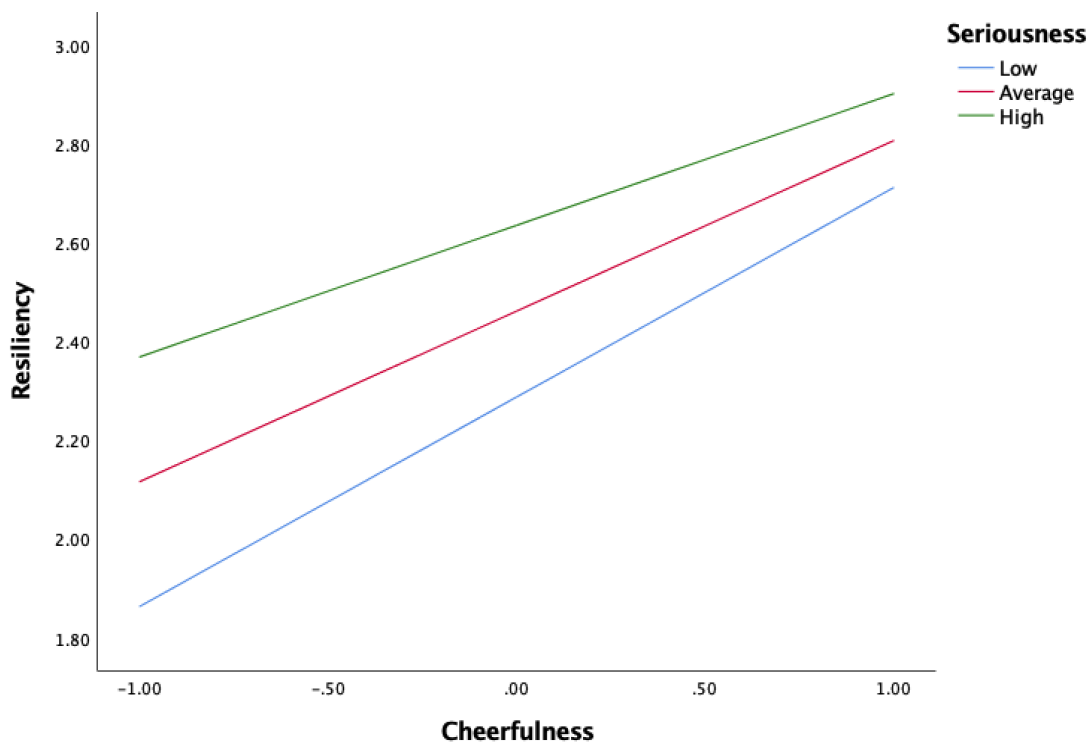
upper limit.

To visualize these associations, Figure 6 illustrates the simple regression slopes at three levels of seriousness with cheerfulness and resiliency as the predictor and outcome, respectively, which reflect the strength of the indirect effects across levels of the moderator. At high levels of cheerfulness, resiliency levels were similar for individuals with low, average, or high seriousness (Mean \pm 1 SD, respectively; $F[2, 95] = .35$, $p > .05$). Amongst individuals with low levels of cheerfulness, resiliency scores differed amongst various levels of seriousness with a medium effect size (Mean \pm 1 SD, respectively; $F[2, 94] = 9.06$, $p < .001$, $\eta^2 = .16$). Post hoc analyses with Bonferroni

corrections revealing individuals high in seriousness reported significantly greater resiliency than average ($p < .05$) and low levels of seriousness ($p < .001$). Individuals average in seriousness also scored significantly higher in resiliency than low levels of seriousness ($p < .05$), suggesting individuals with low cheerfulness and seriousness had the lowest resiliency scores.

Figure 6

Simple Slopes Analysis of Seriousness as a Moderator in the Association between Cheerfulness and Resilience



Note. Mean, standard deviation, and variance of resiliency variable are 2.46, .69, and .48, respectively. Cheerfulness values on the x axis are in standard deviations. Simple slopes from the top down correspond to high, average, and low.

8.4. Discussion

The present findings suggested that cheerfulness is associated with greater resiliency and SWB, which remains consistent with the literature indicating trait cheerfulness is associated with better emotional management (Yip & Martin, 2006). These results reflect on the potential benefits of humor and cheerfulness-enhancing interventions, as Ruch and colleagues (2018) found individuals who are less trait cheerful were more likely to express interest in participating in humor interventions compared to reference samples at baseline. Results suggest that a cheerful disposition allows individuals to thrive under adversity regardless of levels of seriousness and the model subsequently shows resiliency is positively associated with SWB. This study contributes to existing findings investigating pathways that cheerfulness may lead to hedonic well-being (Ruch & Hofmann, 2012).

As such, the current findings confirm the usefulness of the increasing numbers of humor interventions aiming to enhance cheerfulness to strengthen key humor habits and skills to promote a humorous perspective in everyday life (see Ruch & Hofmann, 2017 for a review). For individuals low in cheerfulness, higher seriousness was associated with greater resiliency. Trait seriousness may have some underlying benefits since a more thoughtful and serious frame of mind may balance low cheerfulness, as seriousness may promote resiliency through task-oriented coping or avoiding risky behaviors and habits (Campbell-Sills, Cohan & Stein, 2006; Edwards, 2012). Future studies should examine whether facets of seriousness (e.g., preference for activities with rational reasons, setting long-term goals) may provide differential results in resiliency and well-being compared to trait seriousness as a global trait.

The present limitations include the use of retrospective self-report measures which are vulnerable to common method biases. The cross-sectional nature of the data limits any inference concerning the direction of the observed associations. Future research could adapt longitudinal designs to elucidate the direction of these associations to consider their practical implications. Moreover, the WHO-5 as a subjective well-being measure includes an item with the term “cheerful,” which may inflate estimates. Despite limitations, the current study makes a theoretical and practical contribution to the literature that can advance a multifaceted framework in understanding the mechanisms for which cheerfulness may promote resiliency and well-being.

CHAPTER 9: Study Eight

Title: Is humor temperament associated with being creative, original, and funny?
A tale of three studies⁹

9.1. Introduction

Creativity is broadly defined as an individual's ability to innovate new ideas, draw novel links between these ideas, and explore newfound solutions to problems that are useful or influential (Paulus & Nijstad, 2003; Runco, 2004). Over the years, findings emerged in the creativity literature that point to multidimensional theories for the assessment of creative behaviours through self-report, other-report, and various performance tasks (Ruch & Heintz, 2019). While creativity may be defined as eminence of infamous discoveries and major achievements of civilization, these behaviours tend to exhibit low base rates and remain difficult to quantify in the general population (Tohver & Lau, 2020). To address this limitation, Kaufman (2012) proposed a self-report assessment of five domains of self-report creativity, including self/everyday, scholarly, performance, mechanical/scientific, and artistic creativity. These five factors may be distinguished as empirically separate constructs that may be assessed on a personal level (e.g., seeing obstacles as opportunities, effectively managing interpersonal relationships), as well as impacting ones' ability to contribute to the arts and science.

Indeed, personality remains an important predictor for general and specific aspects of creativity (Batey & Furnham, 2006). Ruch and Heintz (2019) reviewed research on all aspects of humor as it relates to creativity and discussed the importance of

⁹ A version of this manuscript has been submitted for publication.

understanding humor and its association with creativity from a variety of perspectives (e.g., humor as a trait or ability, self-report, peer-report). More specifically, the sense of humor can be expressed as a style, representing an individual's typical behaviour (e.g., cheerfulness, predominant mood, aesthetic perception). Humor can also be expressed as maximal behaviour (i.e., humor creativity, humor production), which represents the skill or competence to create humorous comments that can be measured as quantity (e.g., number of jokes) or quality (i.e., strong agreement content is funny, creative, and witty; Brodzinsky & Rubien, 1976; Ruch & Hofmann, 2012). Humor as an ability could refer to humor delivery, in which the content expressed by the individual is seen as amusing, funny, and/or witty by a variety of individuals (Hehl & Ruch, 1985). This distinction becomes important in evaluating the literature, as an individual who tends to engage in humorous banter may not be skilled at making good quality jokes (i.e., humor ability). Indeed, Greengross and Miller (2011) found that comedians provided higher quality and quantity of funny cartoon captions compared to undergraduate students. Thus, the ability to spontaneously invent creative and humorous responses in these research settings have predictive validity in an individual's creative achievement in humor production.

In terms of humor ability, Greengross & Miller (2011) found that general intelligence and verbal intelligence both predicted humor production ability, as measured using funniness of cartoon captions. Greengross and Miller (2011) proposed that findings suggest humor signals superior cognitive skills, which may be advantageous for survival and reproduction. Howrigan and MacDonald (2008) found that general intelligence predicted humor ability, even when controlling for Big Five personality traits. Moreover, the researchers found that intelligence was a better predictor for rater-judged humor than

extraversion in males (Howrigan and MacDonald, 2008). However, Hall (2015) found that humor appreciation was positively associated with extraversion over signalling intelligence. Humor production was not associated with intelligence and verbal ability as measured by high school and college grade point average (GPA) and American college test (ACT) scores in the study (Hall, 2015). Moreover, humor production found in Facebook profiles was associated with extraversion and not intelligence (Hall, 2015). These results suggest personality characteristics play a major role in the creative aspects of humor production.

While there are multiple theoretical frameworks that proposed humor production and creativity are interrelated, few studies have examined whether the temperamental basis of humor promotes creativity (Ruch & Heintz, 2019). The state-trait model of cheerfulness is postulated to be central to the temperamental basis of humor that can account for intra- and interindividual differences in exhilaratability. The model postulates that engaging in humor (e.g., as a typical behaviour) characteristically requires a combination of high cheerfulness, low seriousness, and low bad mood. Individuals high in cheerfulness can more easily induce feelings of exhilaration and amusement and tend to maintain a cheerful perspective, presence, and composure both alone and interpersonally (Ruch et al., 1996; Ruch & Hofmann, 2012). Previous findings suggested that trait serious individuals were rated as low on quality of humor and used less humorous punchlines (Ruch & Kohler, 1998). Bad mood, which portrays negative affectivity and a sullen mood, tends to hinder the production of positive affect and readiness to engage in humor-related activities (Ruch & Hofmann, 2012).

Previous research suggested that humorous reappraisals may attenuate negative emotions, further suggesting that engagement in humor allows individuals to cope with distressful experiences (Samson et al., 2014; Strick et al., 2009). According to Lersch (1972), cheerfulness is similar but distinct from humor, in that humor is a product of cheerfulness (Ruch & Carrell, 1998). Empirical evidence demonstrated trait cheerfulness is widely associated with positive psychological and physical outcomes, including better social competence, emotional regulatory processes, and life satisfaction (López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2018; Papousek & Schuler, 2010; Ruch & Hofmann, 2012; Yip & Martin, 2006). Moreover, Fredrickson's broaden-and-build theory (2004) suggested that exposure to positive affective states expands one's cognitive capacity and flexibility, allowing one to better adapt to changes to one's environment and to daily difficulties (Fredrickson & Branigan, 2005). These findings imply that cheerful individuals may be better equipped to cope with everyday stressors and enables the activation of more creative solutions.

9.1.1. Study Eight Overview

To date, few studies have thoroughly investigated whether the temperamental basis of humor or traits cheerfulness, seriousness, and bad mood are associated with creativity. While the temperamental basis of humor can be assessed as both traits and states, only traits were examined in this study. The present study aims to investigate this research objective in three parts.

Part One of Study Eight examined the relations between humor temperament (i.e., cheerfulness, seriousness, bad mood), and self-report and other-referent ratings of creativity (i.e., judges' ratings of participants' creativity consisting of wit, originality, and

humor). Previous findings suggested that humor production is associated with creativity (Kovac, 2000; Ziv, 1980) and humor may be a facet of creativity (Vangundy, 1984). The present study aims to examine if the temperamental basis of humor facilitates creativity (Ruch & Heintz, 2019). Fredrickson's broaden-and-build theory (2014) suggests that positive emotions expand one's thinking and actions, which is conducive to enhancing creativity. Cheerfulness is characterized by having a lighthearted overall outlook and composure, which predisposes one to humor and laughter in the face of challenges (Ruch et al., 2019). Cheerfulness could, therefore, facilitate creative thoughts and behaviours. Bad mood may signal external threat or paucity of resources psychologically and physiologically, which may hinder creative thinking in order to allocate resources accordingly (Fiedler, 1988; Morris, 1989). Seriousness may predict a lower level of quality and quantity of humor (Ruch & Kohler, 1998). Participants completed a creative sentence writing task and blind judges rated each creative sentence on wit, originality and humor. Importantly, other-report measures of creativity were used to reduce concerns with common method variance from usage of self-reported measures taken by the same participants (Podsakoff & Organ, 1986).

Part Two of Study Eight examined whether those high on trait cheerfulness coped with everyday stressors more effectively. Everyday creativity is characterized as knowing oneself and one's ability to manage emotions and problem solve in social settings and everyday happenings (Kaufmann, 2012). The construct encompasses an individual's understanding of their own desires and capacities, their ability to understand, communicate, and interact with others effectively, as well as how well they deal with their environment and everyday occurrences (Gardner, 2000; Kaufman, 2012). For Part

Two, participants completed the STCI trait version and a task to describe how one resolved a recent conflict or difficult situation in one's life. Five research assistants rated "how well did the individual cope with stress." This task investigates whether temperamental basis of humor traits are associated with coping with stressors in a more effective way (i.e., defined as part of "everyday creativity" defined by Kaufmann [2012]). Given that cheerfulness is conceptualized as viewing adverse life circumstances in a composed manner and adapting a cheerful mood and interaction style, cheerfulness may be positively associated with everyday creativity. Likewise, bad mood may be negatively associated with everyday creativity.

Part Three of Study Eight examined the associations between STCI variables, comic styles, and judges' ratings of originality, wit, and use of humor in a humor related task. One limitation of Part One is that the creativity assessed is not related to humor production. Ruch and Heintz (2019) commented that while O'Quin and Derks (1997) reported positive correlations between humor production and creativity, the review did not control for covariates such as positive affect, intelligence, and optimism. Humor creation and creativity require both quality and novelty (Kaufman & Kozbelt, 2009). Thus, the third study addresses this gap in the literature through assessing whether the temperamental basis of sense of humor and comic styles are associated with more creative and humorous responses. Heintz (2019) used the Cartoon Punch line Production (CPPT-K) to assess the quantity, wittiness, originality, and quality in humor and its correlates with humor traits. However, it did not measure mocking humor and Heintz (2019) recommended future research to examine the impact of mocking humor. More

specifically, in Part Three, participants completed the Humor Response Task and were asked to provide the most humorous response possible (i.e., humor ability).

9.2. Part One Methods

9.2.1. Participants

The sample consisted of undergraduate students ($N=620$; 64% females) enrolled in the University of Western Ontario in Canada. Participants were recruited to participate in this study online using Qualtrics, a web-based survey tool. Students' ages ranged from 17 to 38 years ($M = 18.81$, $SD = 2.15$). In terms of country of birth, 431 were born in Canada (69.3%), 20 were born in United States (3.2%), and 169 were born outside of North America (27.5%). In terms of ethnicity, 274 identified as European White (43.4%), nine identified as Hispanic (1.4%), 15 identified as Black (2.4%), four identified as Native American (.60%), 240 identified as Asian/Pacific Islander (38.0%), and 79 identified as “other” (e.g., biracial) or preferred not to say (12.5%). The study was approved by the Non-Medical Research Ethics Board at the University of Western Ontario prior to data collection.

9.2.2. Measures

Humor Temperament. The standard version of the State Trait Cheerfulness Inventory – Trait Version (STCI-T60) measures three dimensions of cheerfulness, seriousness, and bad mood (Ruch, Köhler, & van Thriel, 1996). The STCI-T60 demonstrated strong internal reliability and test-retest reliability, as well as structural, concurrent, and predictive validity (Hofmann, Carretero-Dios, & Carrell, 2018; Ruch et al., 1996; Ruch & Hofmann, 2012). The measure is comprised of 60 items utilizing a four-point scale (1 = *strongly disagree*, 4 = *strongly agree*). Bayesian single-test reliability analyses with

MacDonald's ω demonstrated acceptable reliability for all three subscales (cheerfulness $\omega = .91$; seriousness $\omega = .79$; bad mood $\omega = .92$).

Kaufman Domains of Creativity Scale (K-DOCS). The K-DOCS is a 50-item multidimensional measure of five factors of creativity using a five-point (1 = *much less creative*, 5 = *much more creative*) scale (Kaufmann, 2012). Bayesian single-test reliability showed acceptable reliability with MacDonald's ω for all five creativity domains: everyday ($\omega = .79$), scholarly ($\omega = .81$), performance ($\omega = .84$), science ($\omega = .82$), and art ($\omega = .85$). As suggested by Kaufman (2012), the questions were presented in a randomized order for all participants.

Flourishing. Flourishing was measured using the reliable and validated eight-item flourishing scale (Diener et al., 2010). Participants evaluated each item on a seven-point Likert-type scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*. Bayesian single-test reliability analysis demonstrated acceptable reliability (MacDonald's $\omega = .79$).

Creativity Task. Creativity was assessed using Zhu and colleagues' (2009) linguistic creativity measure. Participants were provided with ten common words (i.e., sun, water, warm, eating, money, tasty, sea, beautiful, pain, fun) and were instructed to "try to write a creative sentence about each keyword" (Tilburg, Sedikides, & Wildschut, 2015). Given the large number of sentences to rate, a total of 186 participants' responses (for a total of 1860 sentences) were randomly selected for judges to rate. All responses were linked to an anonymous identification code. Judges, unaware of study hypotheses or participants' demographic variables or scores in personality scales, coded the sentences for creativity in each response: wit "how witty do you consider this sentence to be?" (1 = *not at all*, 5 = *very much*), originality "How original do you consider this sentence to be?" (1 = *not at*

all, 5= *very much*), and humor “to what extent did the individual use humor in their sentence?” (0=*no evidence of humor* 1= *little humor* 2= *some humor/lots of humor*). Each participants’ score on each category was the average of the category score of the 10 sentences. Judges were provided specific instructions on a standardized rubric that was modified for this task based on a standardized rubric provided by Ruch and Heintz (2019). A copy of the rubric can be found in Appendix I.

9.2.3. Data Analysis

Bayesian correlation tests with Pearson product-moment correlation coefficients were conducted between humor temperament, self-report creativity, and judges’ ratings of wit, originality, and humor for the sentences (JASP Team, 2018). Jeffreys’s Bayes Factor (1961) described the observed data using a priori and posterior distribution, which allows quantification of evidence in favor of the alternative and null hypothesis (Ly, Verhagen, & Wagenmakers, 2016; Wagenmakers, 2007). Bayes Factors for evidence of alternative hypotheses can be interpreted with 1–3 as weak, 3–10 as substantial, 10–30 as strong, 30–100 as very strong, and >100 as decisive (Jarosz & Wiley, 2014). All tests were conducted under a default uniform prior using JASP 0.14. Intraclass correlations were conducted on SPSS version 26.

9.2.4. Study Hypothesis

First, it was hypothesized that cheerfulness is positively associated with self-report self/everyday creativity and scholarly creativity. Second, it was hypothesized that self/everyday creativity mediates the association between cheerfulness and flourishing. Finally, it was hypothesized that cheerfulness and bad mood were not associated with

creativity as rated by judges. Moreover, seriousness was hypothesized to be associated with less creative responses.

9.3. Part One Results

Descriptive statistics and Bayesian correlations with Pearson product-moment correlation coefficients of the study variables were computed (Table 19). Cheerfulness was positively associated with self/everyday creativity ($r = .49$; $BF_{10} > 100$; decisive evidence) and scholarly creativity ($r = .15$; $BF_{10} > 30$; very strong evidence). There was substantial evidence that cheerfulness was positively correlated with performance creativity ($r = .12$; $BF_{10} > 3$). Seriousness was positively associated with self/everyday creativity ($r = .24$; $BF_{10} > 100$; decisive evidence), scholarly creativity ($r = .21$; $BF_{10} > 100$; decisive evidence), and mechanical creativity ($r = .14$; $BF_{10} > 10$; very strong evidence). Bad mood was negatively associated with self/everyday creativity ($r = -.36$; $BF_{10} > 100$; decisive evidence) and scholarly creativity ($r = -.12$; $BF_{10} > 3$; substantial evidence). There was no evidence for other associations between humor temperament and self-report creativity.

9.3.1. Mediation Analysis

Descriptive statistics and correlations of cheerfulness, self/everyday creativity, and flourishing were computed (Appendix J). No significant deviations concerning linearity, homogeneity, and homoscedasticity were observed. Zero-order correlation analyses showed cheerfulness was positively associated with self/everyday creativity and flourishing. Schoemann and colleague's (2017) algorithm was utilized to estimate sample size and statistical power for complex path analytic models with indirect effects using

Monte Carlo simulations. Findings showed a power value of .96 when using $N = 620$, 1,000 number of replications, and 1000 Monte Carlo draws per replication.

A mediation effect model was tested in which self/everyday creativity was the mediator and trait cheerfulness and flourishing were the predictor and outcome, respectively. A bootstrapping procedure with 1,000 new samples taken from the current sample and confidence intervals were computed using a bias-corrected percentile method (Biesanz, Falk, & Savalei, 2010). The total amount of variance accounted for by the overall model was 44.2%. The total effect of cheerfulness on flourishing was significant [$\beta = .07$, $SE = .004$, BCa 95% CI (.07, .08), $p < .001$]. The direct effect of cheerfulness on flourishing [$\beta = .06$, $SE = .004$, BCa 95% CI (.05, .07), $p < .001$] and indirect effect of cheerfulness [$\beta = .01$, $SE = .002$, BCa 95% CI = (.01, .02), $p < .001$] were significant.

Table 19

Descriptive Statistics and Bayesian Correlations Among STCI-T60, K-DOCS and Flourishing Variables

Variable	<i>M</i>	<i>SD</i>	1		2		3		4		5		6		7		8		9	
			<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀
1. Cheerfulness	3.14	.44																		
2. Seriousness	2.65	.35	-.02	<1																
3. Bad Mood	2.16	.53	-.67	>100	.09	<1														
4. Self/Everyday Creativity	3.69	.54	.49	>100	.24	>100	-.36	>100												
5. Scholarly Creativity	3.26	.63	.15	>30	.21	>100	-.12	>3	.40	>100										
6. Performance Creativity	2.95	.83	.12	>3	.06	<1	-.06	<1	.17	>100	.26	>100								
7. Mechanical Creativity	2.73	.80	.01	<1	.14	>10	-.03	<1	.08	<1	.15	>30	.33	>100						
8. Artistic Creativity	3.24	.83	.08	<1	-.01	<1	-.01	<1	.18	>100	.27	>100	.42	>100	.25	>100				
9. Flourishing	5.69	.90	.62	>100	.13	>3	-.61	>100	.48	>100	.21	>100	.09	<1	.09	<1	.02	<1		

Note. $N = 620$. r represents Pearson's r and BF_{10} indicates Bayes Factors where evidence of alternative hypotheses can be interpreted with 1–3 as weak, 3–10 as substantial, 10–30 as strong, 30–100 as very strong, and >100 as decisive.

9.3.2. Creativity Ratings

Ratings were calculated for consistency across the judges for overall rated response. ICC for judges' agreement were as follows: .93 [.91, .94] for originality, .82 [.78, .86] for wit, and .92 [.90, .94] for humor. Ratings on originality, wit, and humor were not associated with age or sex. There was weak-to-no evidence that cheerfulness, seriousness, and bad mood were associated with judges' ratings of originality, wit, and humor. Descriptive statistics and bivariate correlations are shown in Table 20. There was substantial evidence that originality ($r=.22$, $BF_{10}=5.70$) and wit ($r=.22$, $BF_{10}=6.75$) were positively associated with self-report performance creativity. There was no evidence that judges' ratings of originality, wit, or humor were associated with other forms of creativity.

Table 20

Descriptive Statistics and Bayesian Correlations Among STCI-T60 and Creativity Task Variables

Variable	<i>M</i>	<i>SD</i>	1		2		3		4		5		6	
			<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀
1. Cheerfulness	3.14	.44												
2. Seriousness	2.65	.35	-.02	<1										
3. Bad Mood	2.16	.53	-.67	>100	.09	<1								
4. Originality Ratings	2.27	.53	-.01	<1	-.19	>1	.03	<1						
5. Wit Ratings	1.71	.31	-.01	<1	-.17	>1	.04	<1	.92	>100				
6. Humor Ratings	.22	.27	.03	<1	-.15	<1	-.01	<1	.56	>100	.74	>100		

Note. $N = 620$. r represents Pearson's r and BF_{10} indicates Bayes Factors where evidence of alternative hypotheses can be interpreted with 1–3 as weak, 3–10 as substantial, 10–30 as strong, 30–100 as very strong, and >100 as decisive.

9.4. Part One Discussion

Part One of Study Eight investigated the associations between humor temperament (i.e., cheerfulness, seriousness, bad mood), self-report creativity, and judges' rating of creativity (i.e., wit, originality, humor). The first hypothesis was supported, in which cheerfulness was positively associated with self-report self/everyday and scholarly creativity. Kuiper et al. (1992) found evidence that high sense of humor (i.e., as a trait) was associated with positive affect for positive events and these individuals maintained a high level of positive affect when facing adversities. Consistent with these findings, the second hypothesis was supported in which self/everyday creativity partially mediated the association between cheerfulness and flourishing. These results suggested that cheerful individuals may promote greater self/everyday creativity interpersonally (e.g., getting people to feel more relaxed or at ease and provide greater emotional support for others and manage relationships more effectively; Ruch & Hofmann, 2012). Moreover, seriousness was associated with self/everyday, scholarly, and mechanical creativity. Indeed, creativity may manifest in individuals who are both playful and demonstrate discipline (Csikszentmihalyi, 2013).

The hypothesis that cheerfulness and bad mood were not associated with judges' ratings of creativity and humor was supported. Indeed, originality and wit were positively associated with performance creativity, yet none of the temperamental basis of humor traits were associated with performance creativity. Humor traits typically represent typical behaviour (i.e., habitual) as opposed to maximal humor creation quality (Ruch & Heintz, 2018). Previous studies found the quantity (i.e., not quality) score in a humor production task was predicted by creativity, humor temperament (cheerfulness,

seriousness, bad mood), and general intelligence (Ruch & Heintz, 2019). There was weak evidence seriousness was associated with less wit and originality. These results are somewhat consistent with previous findings that suggested seriousness predicted less punchlines (i.e., quantity in humor) and punch lines ratings written by individuals who scored high in seriousness were rated as less humorous (i.e., quality of humor; Ruch & Kohler, 1998). Seriousness may be a predictor for less wit, as seriousness predicts a lack of interest in engaging in humorous interactions or engaging in playful interactions (Feingold & Mazzella, 1991; Ruch, 2012). Moreover, humor usage in creative writing was not associated with the temperamental basis of humor traits. Indeed, the creative sentence writing process did not prompt participants to use humor and results may differ if participants were prompted to write humorous sentences (see Part Three).

9.5.0. Part Two Methods

Creativity is defined as the ability to create original and useful ideas that can be used to generate creative solutions and help others (Feist, 1998; Richards and Kinney 1990; p.209). Part one found strong associations between cheerfulness and self-report self/everyday creativity. It is important to use a different approach that complements self-report data and provides further evidence to solidify the results. The purpose of Part Two was to investigate whether humor temperament was associated with creativity in everyday life.

9.5.1. Participants

Participants consisted of university students ($N = 439$; 64.5% female) averaging 19.05 years of age ($SD = 1.78$ [range 16, 36]) enrolled in the University of Western Ontario. Students were recruited to participate in this study online using Qualtrics, a web-

based survey tool. In terms of proficiency in the language, English is the first language of 73.8% of the sample and 94% of the sample identified their English as proficient to very proficient. The study was approved by the Non-Medical Research Ethics Board at the University of Western Ontario prior to data collection.

9.5.2. Measures

Humor Temperament. Description of the format and psychometric properties of the STCI-T60 were provided in Part One. For this study, Bayesian single-test reliability analyses with MacDonald's ω demonstrated strong reliability for all three subscales (cheerfulness $\omega = .92$; seriousness $\omega = .80$; bad mood $\omega = .91$)

Activities and Stress Writing Task. Participants were instructed the following: "please describe activities or events in the past week that come to your mind and how you felt doing them." Five judges were asked upon reading each response: "Based on this information, to what extent would you agree to the statement: This person is able to cope with stress well." Each judge rated the responses on a five-point scale (1= *Strongly Disagree*; 5= *Strongly Agree*). This exercise does not prompt the writer to specifically describe stress or conflict.

Managing Conflict Writing Task. Participants were instructed the following: "Please describe how you resolved a recent conflict or difficult situation in your life." Upon reading the participant's response, judges were asked the following: "how effective did this person resolve the recent conflict or difficult situation?" Ratings were provided on a five-point Likert-type scale (1= *not effective/ ineffective*; 5 = *very effective*). This exercise prompted the writer to specifically write out how they coped with a situation.

9.5.3. Data analysis

Bayesian regression analyses were performed with age and gender as covariates to quantify the evidence for the null and alternative hypotheses (Wagenmakers et al., 2018). The default prior for fixed effects (r scale prior width = 0.5) was used. A current limitation in most Bayesian linear regression methods is that the prior structure of the regression coefficients does not allow factors as categorical values. Frequentist regression analyses were conducted, which supported findings from Bayesian analyses. Bayesian regression was carried out using JASP (version 0.9.2.0) and frequentist regression analyses were conducted on SPSS version 26.

9.6. Part Two Results

9.6.1. Judges Agreement

The sample of judges consists of five research assistants blind to the study hypotheses and rated 439 statements (i.e., one provided by each participant). Intraclass Correlations (ICC) were used to evaluate inter-rater agreement between judges' agreements on both writing tasks (Shrout & Fleiss, 1979). ICC values on the stress and managing conflict tasks were .79 [.71, .84] and .83 [.81, .86], respectively, demonstrating acceptable agreement amongst judges.

9.6.2. Bivariate Correlations

Descriptive statistics and Bayesian Pearson's r correlations are presented in Table 21. Results demonstrated that cheerfulness was associated, with decisive evidence for the alternative hypothesis, with judges' ratings that the individual coped with stress better ($r=.23$; $BF_{10} > 100$) and showed greater effectiveness in solving the conflict ($r=.19$; BF_{10}

>100). Bad mood was negatively associated with better management of stress ($r = -.29$; $BF_{10} > 100$; decisive).

Table 21

Descriptive Statistics and Bayesian Correlations Among STCI-T60 variables, Activities and Stress Writing Task and Managing Conflict Writing Task

Variable	<i>M</i>	<i>SD</i>	1		2		3		4		5	
			<i>r</i>	BF_{10}	<i>r</i>	BF_{10}	<i>r</i>	BF_{10}	<i>r</i>	BF_{10}	<i>r</i>	BF_{10}
1. Stress Ratings	3.13	.62										
2. Conflict Ratings	3.75	.73	.17	>10								
3. Cheerfulness	3.08	.47	.23	>100	.19	>100						
4. Seriousness	2.70	.37	.11	<1	.12	>1	.04	<1				
5. Bad Mood	2.19	.52	-.29	>100	-.13	>1	-.59	>100	.08	<1		

Note. $N = 439$. r represents Pearson's r and BF_{10} indicates Bayes Factors where evidence of alternative hypotheses can be interpreted with 1–3 as weak, 3–10 as substantial, 10–30 as strong, 30–100 as very strong, and >100 as decisive.

9.6.3. Regression analysis

Bayesian regression analyses were performed to predict judges' ratings of stress with cheerfulness as the predictor. The linear regression calculated to predict judges' rating of stress based on cheerfulness, age, and gender was significant ($F [3,416] = 7.82$, $p < .001$), with an R^2 of 5.3%. A Bayesian regression analysis was used to quantify support for the above-mentioned effects with a $P(M)$ of .125. The Bayes factor related to the cheerfulness only model showed that the data were 6452 times more likely under the alternative model than under the null model, indicating decisive evidence.

Similarly, Bayesian regression analyses were performed to predict judges' rating of conflict with cheerfulness as the predictor. The linear regression calculated to predict judges' rating of stress based on cheerfulness, age, and gender was significant ($F [3,427] = 5.28, p < .001$), with an R^2 of 3.6%. With a P(M) of .125 in the Bayesian analysis, the Bayes factor related to the cheerfulness only model showed that the data were 187 times more likely under the alternative model than under the null model, indicating decisive evidence.

9.7. Part Two Discussion

Numerous studies demonstrated that positive affect may facilitate the production of novel and useful ideas (Amabile, Barsade, Mueller, & Staw, 2005; Isen, Daubman, & Nowicki, 1987; Greene & Noice, 1988). Consistent with self-report findings in Part One, Part Two findings revealed strong support that trait cheerfulness predicted better coping with stress in everyday situations and how well an individual dealt with a difficult situation or conflict. Individuals who are cheerful may have a more optimistic evaluation towards life and perceive threats less negatively (Ruch & Hofmann, 2012). Moreover, individuals who are cheerful may have a more optimistic evaluation towards themselves which facilitates behavioural activation, as described in Study Six.

Individuals who scored high on trait seriousness were not rated as being capable of coping effectively with everyday stressors in Part Two which contrasted with the findings from Part One where trait seriousness was associated with self-report everyday creativity. These findings may be affected by differences between the described conflict resolution strategies used by individuals who scored high on trait seriousness compared to those who scored high on trait cheerfulness. For instance, managing a difficult

interpersonal relationship may involve confronting the issue directly with another for an individual high on trait seriousness, while an individual high on trait cheerfulness might deal with the same situation by interpreting it less seriously (e.g., “letting go of the problem” and simply laughing it off). Although both may be effective conflict resolution strategies (depending on the circumstances) that involve self/everyday creativity, the more “lighthearted” strategy used by those high in trait cheerfulness may be interpreted as a more effective strategy than the former employed by those high on trait seriousness.

Indeed, Yip and Martin (2006) suggested that serious individuals are equally competent as more playful individuals at effectively handling conflict, asserting themselves, offering emotional support, and self-disclosing. Those with more playful and less serious outlooks on life tended to be more willing to take interpersonal risks in a playful manner. Conversely, trait bad mood was negatively associated with social competence and emotional management ability (Yip & Martin, 2006). Some research has suggested humor-related states (e.g., watching a comedy film) induce creativity (Isen, Daubman, & Nowicki, 1987). For bad mood, the generation of positive affect is impaired by the presence of predominant negative affective states (Ruch & Hofmann, 2012). Moreover, positive mood state was associated with quantity of ideas generated, as well as the flexibility of ideas (Zenasni & Lubart, 2002). Indeed, the cognitive tuning model posits that an individual’s cognitive system and physiological responses adjust according to personal feelings of safety and danger (Morris, 1989). That is, bad mood indicates a real or imagined presence of external threats or a lack of psychological resources, while cheerfulness implies a “safe” and welcoming overtone (Fiedler, 1988; Schwarz, 1990). The former activates the parasympathetic nervous system which allocates resources to

allow the body to conglomerate its resources for survival (Field, 2016). As such, bad mood would be suboptimal for creativity. In addition, creativity is related to self-reflection, which is associated with a penchant for rumination that may cause symptoms of depression (Verhaeghen, Joormann, & Khan, 2005). More specifically, brooding, a form of self-reflection characterized by negative mood and associated with creative behavior, was linked with greater risk for depression (Verhaeghen, Joormann, & Aikman, 2014). Thus, these findings coincide with the present findings such that trait bad mood was negatively associated with managing stressful situations effectively.

9.8. Part Three Methods

Part one found that humor temperament was not associated with more humorous responses in their creative writing task. One limitation was that participants were not prompted to provide a humorous response. Part three aims to address this limitation through examining the associations between STCI variables, comic styles, and judges' ratings of originality, wit, and use of humor in a humor-related task. It is hypothesized that cheerfulness and bad mood are positively associated with the use of lighthearted humor responses and mockery styles of humor, respectively. In terms of comic styles, it is hypothesized that fun, wit, and humor would be associated with more lighthearted humor use, originality, and wit in responses (Ruch, Heintz, Platt, Proyer, & Wagner, 2018; Heintz, 2019).

9.8.1. Participants

Participants consisted of university students ($N=234$; 74.7% female) averaging 18.14 years of age ($SD = 1.15$ [range 17, 25]). Participants identified with the following ethnic identity: European White ($n=99$; 41.9%), Asian/Pacific Islander ($n= 88$; 37.3%),

and other ($n=49$ e.g., Hispanic, Black, mixed race). The study was approved by the Non-Medical Research Ethics Board at the University of Western Ontario prior to data collection.

9.8.2. Measures

Humor temperament. Information regarding the STCI-T60 was discussed in Part One. Bayesian single-test reliability demonstrated strong reliability for the three subscales: cheerfulness ($\omega = .92$), seriousness ($\omega = .80$), and bad mood ($\omega = .91$).

Comic Styles. The Comic Style Markers (CSM; Ruch et al., 2018) is a self-report reliable and validated questionnaire consisting of 48 marker items utilizing a seven-point response format from 1 (*strongly disagree*) to 7 (*strongly agree*). Bayesian single-test reliability with MacDonald's ω demonstrated acceptable reliability for all eight styles: fun ($\omega = .75$), humor ($\omega = .70$), nonsense ($\omega = .75$), wit ($\omega = .80$), irony ($\omega = .64$), satire ($\omega = .68$), sarcasm ($\omega = .77$), and cynicism ($\omega = .77$).

Humor Task. Participants completed Howrigan and McDonald's (2008) email task. Participants were asked to imagine they had received an email from a fellow student for a school project on diversity of humorous responses: (1) "If you could experience what it's like to be a different kind of animal for a day, what kind of animal would you not want to be, and why?" (2) "How would you make a marriage exciting after the first couple of years?" (3) "What do you think the world will be like in a hundred years?" A total of 14 raters, unaware of study hypotheses, coded the content for creativity on the item: witty "How witty do you consider this response to be?" (1=*not at all*, 5=*very much*), originality "How original do you consider this response to be?" (1=*not at all*, 5=*very much*), and use of lighthearted and mockery styles of humor "to what extent did the individual use humor

in their sentence? (0=*no evidence of humor*, 1= *little humor*, 2= *some humor/lots of humor*)." All raters were provided a modified version of a coding scheme (Appendix K) for rating originality and wittiness of study participants' responses (Ruch & Heintz, 2018).

9.9. Part Three Results

9.9.1. Judges' Ratings

Intraclass correlations of five judge's ratings of "originality," "wittiness," "lightheart humor," and "mockery humor" were .95 [.94, .96], .96 [.95, .96], .94 [.93, .95], and .93 [.92, .95], respectively.

9.9.2. STCI and Humor

All skewness and kurtosis values were within ± 1 . Descriptive statistics and Bayesian Pearson's r correlations are shown in Appendix L. Cheerfulness was negatively associated with mockery style of humor ($r = -.21$, $BF_{10} > 10$; strong evidence). There was no evidence that cheerfulness was associated with originality, wittiness, and lighthearted humor. There was no evidence that seriousness and bad mood were associated with any of the judges' ratings.

9.9.3. Comic Styles and Humor

Descriptive statistics and Bayesian Pearson's r correlations are shown in Table 22. The comic style humor was associated with judges' ratings of lighthearted humor ($r = .21$, $BF_{10} > 10$) originality ($r = .23$, $BF_{10} > 30$), and wit ($r = .21$, $BF_{10} > 10$). The comic style nonsense was associated with judges' ratings of lighthearted humor ($r = .29$, $BF_{10} > 100$), mockery ($r = .23$, $BF_{10} > 30$), originality ($r = .29$, $BF_{10} > 100$), and wit ($r = .30$, $BF_{10} > 100$). Judges' ratings were not associated with the following comic styles: fun, irony, wit, sarcasm, satire, and cynicism.

Table 22

Descriptive Statistics and Bayesian Correlations Among Humor Temperament, Comic Styles and Humor Task

Variable	<i>M</i>	<i>SD</i>	1		2		3		4		5		6		7		8		9		10		11		12			
			<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀
1. Fun	4.81	1.04																										
2. Irony	4.55	.89	.43	>100																								
3. Wit	4.79	1.00	.46	>100	.50	>100																						
4. Sarcasm	3.79	1.10	.10	<1	.50	>100	.35	>100																				
5. Humor	4.97	.86	.50	>100	.33	>100	.47	>100	.19	>3																		
6. Satire	4.16	.96	.26	>100	.44	>100	.37	>100	.54	>100	.34	>100																
7. Nonsense	4.96	.95	.53	>100	.35	>100	.24	>30	.12	<1	.46	>100	.20	>3														
8. Cynicism	3.85	1.07	.10	<1	.50	>100	.23	>30	.68	>100	.19	>3	.58	>100	.17	>1												
9. Lighthearted Ratings	.50	.36	.10	<1	.03	<1	-.03	<1	-.13	<1	.21	>10	-.12	<1	.29	>100	-.10	<1										
10. Mockery Ratings	.35	.29	.00	<1	.01	<1	-.07	<1	-.01	<1	.11	<1	-.05	<1	.23	>30	-.01	<1	.54	>100								
11. Originality Ratings	2.83	.56	.12	<1	.04	<1	.00	<1	-.14	<1	.23	>30	-.10	<1	.29	>100	-.11	<1	.87	>100	.61	>100						
12. Wit Ratings	2.37	.59	.10	<1	.03	<1	-.03	<1	-.13	<1	.21	>10	-.11	<1	.30	>100	-.10	<1	.90	>100	.71	>100	.96	>100				

Note. $N = 234$. r = Pearson's r and BF_{10} indicates Bayes Factors where evidence of alternative hypotheses can be interpreted with 1–3 as weak, 3–10 as substantial, 10–30 as strong, 30–100 as very strong, and >100 as decisive.

9.10. Part Three Discussion

Contrary to initial hypotheses, trait cheerfulness was not associated with lighthearted humor, originality, or wittiness. This finding suggested that a cheerful disposition may not predict that an individual will be employing lighthearted humor, originality, or wit in the process of humor production. Indeed, the aforementioned studies found that cheerfulness was positively associated with self/everyday creativity in self-reported (Part One) and other-reported (Part Two) findings. Interestingly, trait cheerfulness was negatively associated with mockery style of humor. Study One found that cheerfulness predicted less negative tone in words used, but not a more positive tone. Perhaps trait cheerfulness predicts a lack thereof in negativity rather than predicting positivity in interaction. Moreover, given cheerful individuals tend to maintain composure and a positive presence within oneself and one's interpersonal relationships, using a mockery style of humor characterized by maliciousness, superiority, and an intention to hurt others would not align with a cheerful individual's disposition (Ruch et al., 1996). It would rather be counterproductive to the cheerful individuals' propensity towards creating an amusing and exhilarating environment conducive to positive relations with oneself and peers. This supports the finding in Part Three that trait cheerfulness was negatively associated with mockery humor.

Part Three also revealed that the comic style humor was related to other-referent ratings of lighthearted humor, originality, and wit, while nonsense humor was associated with other-referent ratings of lighthearted humor, mockery humor, originality, and wit. Perhaps the temperamental basis of humor may not precisely predict wittiness and originality in humor production as well as the comic styles humor and nonsense.

Judges' ratings were not associated with the fun, irony, wit, sarcasm, satire, and cynicism comic styles. Generally, indicators of creativity (originality and wit) and of positive humor (lighthearted) were found to be associated with the nonsense and humor comic styles, which are related to emotional strengths (i.e., zest, hope, bravery) and agreeableness (Ruch et al., 2018). These findings are consistent with Heintz (2019) who found that nonsense was positively correlated to quality of humor creation. Conversely, sarcasm, satire and cynicism were not related to agreeableness and emotional strengths (Ruch et al., 2018), suggesting that the ratings of originality, wit, and lighthearted and mockery styles of humor differed in comic styles depending partially on the raters' interpretations of the participants' agreeableness and emotional strengths via their statements, with use of lighthearted humor indicative of more prosocial and interpersonally beneficial characteristics (e.g., agreeableness and emotional strengths) and use of mockery humor indicative of less prosocial characteristics.

9.11. General Discussion

Overall, the present study investigated whether humor temperament was associated with specific aspects of creativity (e.g., originality and wit) through incorporating multiple elements of self- and other-referent elements of creativity. While self-report is useful for individuals to generalize how they may behave day-to-day, blind judges' rating of creativity may mitigate concerns regarding the common method variance from the same respondents (Podsakoff & Organ, 1986). Individuals may also internalize and overgeneralize positive aspects of themselves and associate negative aspects with external factors (Greenberg, Pyszczynski, & Solomon, 1982). Other-referent measures of creativity not only provide creativity ratings from another's viewpoint, but

also establish converging evidence for one's creativity and for more accurate and impartial ratings of an individual's creativity (Ruch & Heintz, 2019).

The first part explored the relation between the temperamental basis of humor (i.e., cheerfulness, seriousness, bad mood) and both self-reported and judges' ratings of participants' creativity (i.e., wit, originality, humor). Findings from Study One suggest that both cheerfulness and seriousness were positively associated with self-reported self/everyday (i.e., effectively problem solving one's way through daily problems) and scholarly creativity (i.e., thinking outside-the-box when it comes to creative analysis, debate, and scholarly pursuits), which supports Csikszentmihalyi's (2013) suggestion that individuals who display playfulness, discipline, or both can all be creative. Consistent with Part One, Part Two also found that individuals high in cheerfulness coped with everyday stressors more effectively than those scoring lower on cheerfulness using two other-referent rating tasks, further solidifying the link between trait cheerfulness and self/everyday creativity. Parts one and two findings are supported by Fredrickson's broaden-and-build theory (2004) which suggests that exposure to positive affective states expands cognitive capacity and flexibility, and this enables individuals to better adapt to daily stressors and changes in their environment. Study One and Study Two have also suggested that trait and state cheerful individuals tend to have more optimistic views of themselves, which Study Six and Study Seven show associations with self-esteem, behavioural activation, and resiliency. Ruch and Hofmann (2012) reported that cheerful individuals tended to problem-solve and cope more effectively with daily stressors and difficulties and the present findings support these claims.

Part One also found that cheerfulness was related to flourishing through self/everyday creativity in a partial mediation model. These results highlight the importance of trait cheerfulness in enhancing one's ability to solve everyday problems and consequently allows one to feel a sense of thriving and fulfillment in life. This is supported by the theory of "interpersonal emotion regulation" which posits that one's positive mood and behaviours can help regulate another's (Zaki & Williams, 2013).

Notably, there were negative associations between bad mood and self/everyday and scholarly creativity ratings (Part One), which suggested that an overtone of unrelenting gloominess creates difficulties in thriving under everyday and scholarly activities. Positive affect may facilitate one to ideate and think more flexibly (Zenasni & Lubart, 2002), while negative affectivity may deplete an individual's psychological resources, subsequently diminishing creative cognitive processes (Field, 2016, Fiedler, 1988, Schwarz, 1990). Bad mood is also associated with brooding, a form of self-reflective rumination that hinders creativity (Verhaeghen, Joormann, & Aikman, 2014).

Part Two findings revealed that individuals who scored high on trait seriousness did not cope more effectively with daily difficulties as rated by blind judges, which is inconsistent with Part One self-report findings. These results may be reflective of the nature of other-referent reports of creativity in Part Two compared to the self-reports in Part One. An individual who is serious may be less likely to use a lighthearted and relaxed approach when managing everyday problems at hand due to their serious nature (Ruch et al., 1996). As such, the serious individual may be managing a daily conflict with ease, however, this earnest and humorless approach may be perceived as less appealing to judges compared to an individual who manages these problems in a playful and

lighthearted manner (i.e., someone who is cheerful). Furthermore, in Part Three, it was revealed the comic styles humor and nonsense were perceived more lighthearted, witty, and original to blind judges. On the other hand, trait cheerfulness was not found to be associated with lighthearted humor, originality, or wit. Hence, the positive aspects of cheerfulness may not extend to originality and wit in creativity (Part One) and humor production (Part Three).

Findings could be applied in the contexts of therapy, education/mentorship, and business. Given that deficits in cognitive flexibility have been associated with depression and anxiety (Gabrys et al., 2018), suicidal ideation (Lai et al., 2018), and eating disorders (Tchanturia et al., 2012), it would be beneficial to further investigate whether using lighthearted statements and humor can help create a cheerful mindset and environment that is conducive to creativity and cognitive flexibility in a therapeutic and work setting.

9.11.1. Limitations

This three-part study is not without limitations. First, participants were not provided a time limit for the writing tasks and it is unclear how long each participant spent on each task. As such, the amount of effort or timeliness of the response were unaccounted for. Second, whereas in everyday interactions humor serves a specific function (e.g., facilitate laughter amongst peers), there was no incentive for humor production as an anonymous participant in a study. Third, there were multiple ways to exhibit creativity in a task whether it is assessed through indicators (e.g., quantity, quality) or modality (e.g., verbal, written, figural, physical; Ruch & Heintz, 2018). The present study only assessed for the self-report indices and creativity evaluation of written responses to a prompt. Future studies should examine other modalities of humor. Finally,

as shown in Study Seven, Ernstheiterkeit (i.e., a German term for cheerful and serious state) may be a desirable quality that is associated with greater levels of creativity (Proyer & Rodden, 2013). Future studies should investigate whether individuals who are both cheerful and serious exhibit greater creativity.

Taken together, trait cheerfulness was positively associated with self/everyday creativity or one's ability to manage everyday stressors and conflicts in self and other-referent reports. These findings can further inform the theoretical model of the psychosocial benefits of a cheerful disposition for future experimental studies and clinical studies.

CHAPTER 12: Discussion

12.1. General Discussion

The State-Trait Cheerfulness Inventory (STCI) measures the temperamental basis of the sense of humor involving cheerfulness, seriousness, and bad mood. The multidimensional aspect of this model considers the temperamental basis of the sense of humor to be a combination of high cheerfulness, low seriousness, and low bad mood that would contribute to exhilaration (Carretero-Dios et al., 2014; Ruch et al., 1996). The model accounts for traits and states, as cheerfulness represents positive affectivity and readiness to engage in humor-related activities and seriousness and bad mood represent dimensions of humorlessness (Ruch et al., 1996). This manuscript-based dissertation sought to address two germane research questions to advance knowledge on the state-trait model of cheerfulness. The objectives were to assess (1) the reliability and validity of newly developed STCI instruments and (2) the psychological correlates between the STCI with measures of humor and well-being. Although the STCI instruments have been adapted into different languages, additional research was needed to assess the reliability and validity of the newly developed instruments. Studies One and Two assessed the reliability and validity of the short-form instruments for efficient assessment. Studies Three and Four evaluated the reliability and validity of the Chinese and Italian translated versions, respectively, to expand knowledge on the conceptualization of the state-trait model of cheerfulness across different cultures. Studies Five through Eight addressed the psychological correlates between the STCI with measures of humor and well-being.

The present dissertation first provided evidence for the reliability and validity of the newly developed short trait (Study One) and state (Study Two) versions for future

research and clinical studies that require shorter assessment. Study One derived a short form of the State-Trait Cheerfulness Inventory - Trait Version (STCI-T30) using an item response theory framework. In terms of reliability, latent trait test-retest correlations and reliability across the latent continuum in the STCI-T30 remained high. Moreover, the STCI-T30 showed external validity with criterion variables (e.g., playfulness) and a short writing task completed by these participants was rated by unacquainted judges to infer the author's cheerfulness, seriousness, and bad mood. Significant self-other and inter-judge agreement of cheerfulness, seriousness, and bad mood and linguistic cues analysis suggested cheerfulness and bad mood manifested through writing in tone, social processes, and affect. While cheerfulness is associated with greater frequency and intensity of laughter, it remained unclear whether cheerful individuals have a more cheerful interactive style as postulated in the state-trait model of cheerfulness (Ruch & Hofmann, 2012). The study addressed this gap in the literature in demonstrating that specific linguistic cues were associated with cheerfulness and bad mood, and to a lesser extent, seriousness. Given that cheerfulness and bad mood have both affective and cognitive components, it becomes apparent cheerfulness and bad mood were associated with behavioural cues that are interpersonal (e.g., cheerful or ill-humored interaction style) beyond facial expressions of smiling and laughter or lack thereof.

While Study One investigated psychometric properties of the trait version, Study Two aimed to assess the reliability and validity of the State-Trait Cheerfulness Inventory–State Version (STCI-S) which measures three states of cheerfulness, seriousness, and bad mood as the temperamental basis of humor. The goals of Study Two were to investigate (1) the development and psychometric validation of a newly

developed short version and (2) test-criterion validity with state measures and language use. Part one confirmed the three-dimensional structure and both the short and standard versions demonstrated acceptable discrimination parameters across well-dispersed threshold values using Samejima's graded response model. Part two replicated these findings in a separate sample. Part three demonstrated expected intercorrelations with self-report state measures (i.e., inspiration, self-esteem, depression, anxiety). Participants were randomized to expressive writing conditions (i.e., writing about a retrospective cheerful, serious, or bad mood scenario). Retrospective states cheerfulness, seriousness, and bad mood, but not at baseline, were associated with linguistic categories (e.g., emotional tone, clout, achievement, insight, achieve, work, past-focused, present-focused) identified in the Linguistic Inquiry and Word Count (LIWC) software in specific writing scenarios. The impact of personality states on word usage may only be evident in specific contexts and situations.

Presence of distinctive language use in these writing samples further demonstrated test-criterion validity and practicality of the STCI-S18. Baumert and colleagues (2017) called for the integration of personality structures with process-oriented approaches to further progress research in personality theories. While the trait-based literature describes population-level covariation of interindividual differences, process-oriented research can be studied through psychological processes in concrete situations (Hampson, 2012). The results of Study Two demonstrated that word usage was associated with different states, but this was dependent upon the specific scenarios participants wrote about. Overall, the results support the notion that situational cues may

interact with specific states and systematic inter-individual differences in processes may occur, thereby affecting behaviour (Baumert et al., 2017).

This dissertation further introduced psychometrically sound STCI instruments in Chinese (Study Three) and Italian (Study Four) and compared the psychometric properties to the English version to these newly developed versions. The development and psychometric validation of these tools allow for future studies in Italian- and Chinese-speaking populations to gain further understanding on the theoretical model at large. Studies Three and Four extended the literature through examining the reliability, structural validity, external validity, and measurement invariance of the Chinese and Italian STCI trait versions. Future research studies may utilize these self-report measures in experimental and clinical settings to conduct both local and cross-cultural research.

In particular, Study Three replicated the three-dimensional factor structure of the STCI in China using 60 items consistent with other standard trait versions (e.g., English, Chilean-Spanish). Closer examination of associations between traits suggested bad mood showed curvilinear associations with both cheerfulness and seriousness, such that cheerfulness and bad mood were negatively associated for those low and average in trait bad mood but not for those with high trait bad mood. Seriousness was positively associated with bad mood at high levels of trait bad mood, but not at average or low levels of bad mood. Associations between the STCI traits and major personality dimensions, humor styles, and well-being were further examined. Cheerfulness and seriousness showed positive associations with satisfaction with life and emotional well-being (EWB) while bad mood showed a curvilinear association with EWB. Using multigroup confirmatory factor analyses, partial metric invariance was found between

English and Chinese versions of the STCI-T60, but structural invariance was not observed. The Chinese version of the STCI can be utilized in future research settings to further expand on the theoretical model of the temperamental basis of humor in Chinese-speaking populations.

In Study Four, the reliability and validity of the translated STCI-T60 Italian version were assessed in a sample of Italian speakers. Proper fit for a three-dimensional factor structure observed in previous studies was replicated and each factor demonstrated acceptable internal consistency and test–retest reliability. The associations between the STCI subscales and major personality dimensions, optimism, resiliency, stress, and general well-being were examined, and results were in the expected directions (e.g., cheerfulness and bad mood being positively and negatively associated with well-being variables, respectively). Cross-cultural invariance examination was conducted to provide more validity data for the Italian STCI. Metric invariance was found between Italian and Canadian English speakers, but scalar invariance was not shown. The Italian version of the STCI can be utilized in future research and clinical settings to further expand on the theoretical model of the temperamental basis of humor in Italian-speaking populations.

To incrementally advance knowledge and understanding in the state-trait model of cheerfulness, the psychological correlates between the STCI with measures of humor and well-being were investigated. While numerous studies reported positive correlations between cheerfulness and subjective well-being, most studies reported on zero-order correlations (Ruch & Hofmann, 2012). Studies Five to Eight aim to provide a comprehensive theoretical framework on the pathways in which cheerfulness is associated with humor and psychological well-being. The dissertation addressed the

association between cheerfulness and well-being through the lenses of humor traits (Study Five), self-esteem and behavioural activation (Study Six), resiliency (Study Seven), and creativity (Study Eight).

Study Five investigated the structure and interplay of facet-to-facet interactions across the temperamental basis of humor along with humor traits using network analysis. Analysis of individual differences may further clarify the association between expression of humor and certain psychological outcomes. In this study, undergraduate students completed the state-trait cheerfulness inventory and humor trait measures (e.g., sense of humor, comic styles, benevolent and corrective humor, humor styles, gelotophobia). The EBICglasso estimator was used to conduct partial correlations between facets in the network. Results showed cheerfulness, seriousness, and bad mood were largely interconnected to humor-related traits, further providing evidence for criterion validity of the temperamental basis of humor model. The nodes SE6 (i.e., humorlessness in cheerful evoking situations), CH5 (i.e., cheerful interaction style), verbal humor, laughter, katagelasticism, humor in everyday life, BM2 (i.e., prevalence of sadness), and gelotophobia were strength central personality traits. The CS-coefficients was high for strength, edge weight, and expected influence, suggesting that centrality indices were highly stable. A variety of different conceptual domains appeared in the network (e.g., laughing at others, laughing with others, mixed styles). It appears that trait cheerfulness was largely associated with variables related to enjoyment of humor and laughter while high degrees of seriousness and bad mood were associated with humorlessness. These findings support the original theoretical model proposed by Ruch and colleagues (1996) that the multidimensional model of cheerfulness, seriousness, and bad mood predict

enjoyment of humor (i.e., through high cheerfulness, low seriousness, low bad mood) and humorlessness (i.e., through low cheerfulness, high seriousness, high bad mood). As Ruch et al. (2018) proposed, traits regarding laughing with others (e.g., fun, laughter, enjoyment of humor), laughing at others (e.g., aggressive humor, mockery), and mixed styles (e.g., wit, cognitive humor, irony) emerged within the network. While controlling for other variables, cheerfulness was largely associated with enjoyment of humor and laughing with others. These findings support Ruch and colleagues' (1996) findings that cheerfulness, as the core component of the temperamental basis of the sense of humor, predicts humor and laughter, which may subsequently promote exhilaration and joy.

While robust findings in the literature have shown positive affect and more positive, lighthearted uses of humor are associated with self-esteem, no study has investigated the role of self-esteem and behavioural activation in the trait cheerfulness and well-being association. Study Six bridges this gap through testing a double mediation path model in a sample of undergraduate students on the effects of self-esteem and behavioural activation on the trait cheerfulness and life satisfaction association. As predicted, self-esteem and behavioural activation, both independent and serially, mediated the positive association between cheerfulness and life satisfaction (SWL). These results suggest that trait cheerfulness predicts higher self-esteem and behavioural activation, which subsequently predicts SWL. Pairwise comparisons amongst the three indirect effects suggest that trait cheerfulness predicting self-esteem and subsequently SWL was significantly larger than the other two effects. Overall, these results provide new insight that may advance a coherent and multifaceted theoretical framework on the pathways in which cheerfulness may enhance psychological well-being.

Study Seven examined how cheerfulness and seriousness may interact relating to resiliency and well-being. This topic was investigated in participants who completed measures of cheerfulness, seriousness, resiliency, and subjective well-being (SWB). The indirect benefits of seriousness on well-being were examined through a moderated mediation model with seriousness as a moderator and resiliency as the mediator between cheerfulness and SWB. Seriousness moderated the association between cheerfulness and resiliency, which is associated with higher SWB. Individuals with high cheerfulness did not differ in resiliency at different levels of seriousness, but individuals with low cheerfulness reported greater resiliency at higher levels of seriousness. Study Seven contributes to a better understanding of the effects on resiliency in possessing a cheerful disposition together with a serious frame of mind.

While humor production and creativity may be interrelated, there remains a paucity of research regarding the associations between the temperamental basis of humor with creativity and well-being. Study Eight investigated whether humor temperament is associated with creativity. Part one investigated the associations between humor temperament (i.e., cheerfulness, seriousness, bad mood), self-report creativity, and judges' ratings of creativity (i.e., wit, originality, humor). Findings revealed cheerfulness and seriousness were positively associated with self/everyday creativity (SEC), while bad mood was negatively associated. Judges' ratings of participant creativity showed weak, negative correlations with seriousness, but were not associated with cheerfulness and bad mood. Part Two of Study Eight evaluated the associations between humor temperament and judges' ratings of how well individuals coped with daily stressors. Cheerfulness was associated with judges' ratings of effective stress management and conflict management,

while seriousness and bad mood were weakly and negatively associated, respectively. Part three examined the associations between humor temperament, comic styles (e.g., fun, nonsense, satire), and judges' ratings of creativity (i.e., originality, wit, humor) in a humor-related task. While humor temperament traits were not associated with creativity, comic styles "humor" and "nonsense" were associated with creativity. Findings revealed humor temperament traits cheerfulness and bad mood were positively and negatively, respectively, associated with creativity in conflict management and coping, but not with humor production or creative writing. Results informed the impact of cheerfulness on increasing cognitive flexibility in generating innovation in everyday creativity. Overall, Studies Five to Eight expand on the theoretical model in understanding mediating and moderating factors related to the temperamental basis of humor that may contribute to humor and subjective well-being.

12.2. Implications for Humor Interventions

Implementation of results established in the dissertation could further assist the intervention literature in developing humor interventions and training programs (see Ruch & Hofmann, 2017 for a review). Hirsch et al. (2010) reported participants of a humor intervention reported increased levels of resiliency and life satisfaction after learning to apply humor skills into their daily lives. Increasing trait and state cheerfulness through humor training interventions and cheerfulness-enhancing practices have also been documented to be beneficial for emotional stimulation and depressed mood changes (Falkenberg, Buchkremer, Bartels, & Wild, 2011; Hirsch & Kranzhoff, 2004; Hirsch et al., 2010; Konradt et al., 2013). Indeed, individuals benefit from humor interventions independent of humor traits evaluated at baseline (Wellenzohn, Proyer, & Ruch, 2018).

For individuals who participate in humor training, life satisfaction increased when comparing intraindividual differences in pre- and post- intervention, and humor training also increased cheerfulness and decreased seriousness (Ruch, Hofmann, Rusch, & Stolz, 2018). Tagalidou et al. (2018) found improvements in coping humor and cheerfulness for individuals of a routine care institution suffering from schizophrenia, personality disorders, anxiety, or depression. Moreover, cheerfulness was enhanced upon completion of structured humor training for individuals diagnosed with coronary artery disease and refractory angina pectoris (Voss, Wild, von Hirschhausen, Fuchs, & Ong, 2019). Thus, the assessment of measurement properties of the English, Italian, and Chinese versions of the instruments will further expand these areas of research.

Given the collective benefits of humor in cross-sectional and intervention studies, it is important to integrate the theoretical and intervention literature to allow for a multifaceted and comprehensive understanding of the state-trait model of cheerfulness. Theoretically speaking, the findings in Study Six suggest that enhancing cheerfulness may lead to increased self-esteem and behavioural activation, which successively leads to greater subjective well-being through treatment and training. The present results indicated that cheerfulness may affect self-esteem, as a cognitive component, and activation of rewarding behaviours, as a behavioural component. These results are also consistent with recent findings that demonstrate the importance of extraversion and well-being as attributed to energy level as opposed to global trait extraversion (Margolis, Stapley, & Lyubomirsky, 2019). Study Eight revealed participants coped with stressful situations better and demonstrated better problem solving in interpersonal situations as rated by blind judges. Indeed, Hofmann, Heintz, Pang, & Ruch (2020) proposed that light

forms of humor may also be fostered by training mindfulness. Taken together, cheerful individuals may experience enhanced self-esteem, behavioural activation, and acquire a more creative approach to solving everyday problems.

While studies have documented enhancing cheerfulness and decreasing seriousness and bad mood as intervention goals, it may not necessarily be beneficial for individuals to decrease seriousness as a goal in treatment (Hirsch et al., 2010; Konradt et al., 2013). As Proyer and Rodden (2013) stated, the theologian Hugo Rahner conceptualized the *homo ludens* as a man of “*Ernstheiterkeit*” (i.e., serious-cheerfulness), an individual who can smile despite adversity but also recognizes the significance and importance of life events. Interestingly, Proyer & Rodden (2013) investigated the concurrence of high cheerfulness and high seriousness within individuals and posited that these individuals experience positivity and a cheerful composure but also recognized the importance of everyday happenings. Seriousness alone does not predict playfulness, but high seriousness and high cheerfulness co-occurring could reflect an active and energetic approach to playfulness. In Study Seven, individuals with high cheerfulness did not differ in resiliency at different levels of seriousness, but individuals with low cheerfulness reported greater resiliency at higher levels of seriousness. As shown in Studies Three and Four, seriousness was strongly linked with conscientiousness and may promote individuals to conduct activities aligned with achieving long-term goals. In Study Eight, seriousness was positively associated with self/everyday and scholarly creativity. Thus, a cheerful disposition combined with high seriousness may have unique underlying benefits.

Interestingly, traits cheerfulness and seriousness were both positively associated with measures of well-being in China. Comparatively, previous findings suggested seriousness showed negative associations with indicators of well-being (Carretero-Dios et al., 2014; López-Benítez, Acosta, Lupiáñez, & Carretero-Dios, 2017). Early Chinese philosophies described Confucius as respectful and showed tasteful, good-natured humor while retaining a serious attitude for life (Yue, 2017). Similarly, Chen et al. (2016) found a small but significant association between trait seriousness and future temporal satisfaction with life. Compared to China, seriousness in Western cultures may be regarded as a stringent or inflexible way of thinking. Future studies should examine the conceptualization of seriousness in Chinese culture and its associations with humor and well-being. Taken together, the question of whether decreasing seriousness should be a goal in intervention may be dependent on the individual and culture at large.

12.3. Limitations and Future Directions

There are several limitations to address in the eight studies conducted in the dissertation. Specifically, the samples comprised mostly of undergraduate students recruited from a single academic institution and the use of student samples is often criticized for their lack of adequate representation of the overall population. Future research should evaluate whether results from the current studies generalize to more diverse samples (i.e., across countries, age groups, education levels, and clinical samples). Moreover, the state-trait cheerfulness inventory measures the temperamental basis of humor as a readiness to engage in humor-related behaviour. However, few studies have evaluated how cheerful individuals produce humor and react to humor in a social setting. The state-of-the-art measurement of the quality of humor production is

usually limited to a set of judges rating the funniness or originality of jokes and content (Ruch & Heintz, 2019). The clear limitation is the lack of ecological validity, as humor can come in many forms in day-to-day interaction, including likelihood of remembering and repeating a joke, coming up with something witty or “punny” in the moment, or creating new or repeating “inside jokes” amongst friends. Future research projects may observe humor behaviours in social interactions or through peer reports to develop further understanding in this area. These methods may increase ecological validity of how the temperamental basis of humor may reveal itself through affect, cognition, and behaviour.

The present dissertation focused on how cheerfulness is associated with well-being, but the potential negative effects of a cheerful disposition were not examined. The majority of peer-reviewed research focused on cheerfulness as a positive characteristic associated with physical wellness and subjective well-being (Ruch & Hofmann, 2012). Schwarcz et al. (1995) found cheerful children have a higher mortality rate at a younger age, and the authors suggested cheerful individuals may demonstrate greater carelessness regarding their health. While cheerfulness is associated with affiliative humor, Kuiper and Nicholls (2004) found individuals high in dispositional humor distanced themselves more from stressful situations, but it did not encourage healthier habits. While cheerfulness may predispose an individual to enjoy humor, humorous appraisal is difficult for participants when the stimuli is self-relevant and more challenging compared to serious humorous appraisal (Geisler & Loureiro de Assuncao, 2014; Geisler & Weber, 2010; Samson et al., 2014). Moreover, humorous appraisal may lead to greater external attribution of failure and less accountability for failure (Geisler & Loureiro de

Assuncao, 2014; Geisler & Weber, 2010; Samson et al., 2014). Future research should examine whether cheerfulness is associated with the downsides of humorous appraisal.

One final limitation of the present manuscript-based dissertation is that the temperamental basis of humor may interact with contextual variables in the surrounding environment. As demonstrated in Study Two, states cheerfulness, seriousness, and bad mood were associated with specific linguistic cues, but only when asked to describe certain themes. Several interesting findings emerged for individual differences in humor interacting with contextual variables. The relevance of the joke, time passed since the tragedy of the joke, and type of violations (i.e., mild for mishaps; severe for tragedies) as it applies to different individuals change the mechanism by which the experience is perceived as humorous or nonhumorous (McGraw et al., 2010, 2012, 2014). Thus, a cheerful disposition (i.e., willingness to laugh and enjoy humor) in certain situations provides benefits for some individuals but could be inappropriate for others.

Consistent with the self-report trait literature, practicing positive humor in the experimental setting provides benefits in regulating positive emotions (Samson & Gross, 2012), down-regulating of negative emotions (Kugler & Kuhbandner, 2015; Strick et al., 2009), protecting against internal attribution of failure (Geisler & Weber, 2010), and producing long-term benefits (Samson, Glassco, Lee & Gross, 2014). These effects sustained and replicated despite controlling for a wide range of variables affecting the humor experience, including requiring greater cognitive demand, providing distraction, testing humor against other appraisal mechanisms, and exposure to mere positivity (Samson & Gross, 2012; Samson et al., 2014; Strick et al., 2009). The experimental literature has demonstrated unique ways in which humor as a behaviour may serve as a

coping mechanism while controlling for confounding variables. Taken together, the integration of the personality and social psychology literature further enhances the understanding in the depths of the state-trait model of cheerfulness, humor, and well-being. Future studies should examine how cheerfulness, seriousness, and bad mood may interact with stressors and humorous appraisal when the individual is exposed to humor-related contextual variables.

12.4. Concluding Statement

The present manuscript-based dissertation provided eight studies that assessed the reliability and validity of newly developed STCI instruments and the association between the state-trait model of cheerfulness with humor and well-being variables. Future research may utilize the newly developed measures and findings in this study to create a broader theoretical framework regarding the state-trait model of cheerfulness.

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APPENDICES

Appendix A

Research Ethics Approval Forms



Date: 15 January 2018

To: Dr. Donald Saklofske

Project ID: 110831

Study Title: Investigating Cheerfulness and Satisfaction with Life: The Mediating Effect of Compassion and Behavioural Activation

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 02/Feb/2018

Date Approval Issued: 15/Jan/2018 10:30

REB Approval Expiry Date: 15/Jan/2019

Dear Dr. Donald Saklofske

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. All other required institutional approvals must also be obtained prior to the conduct of the study.

Documents Approved:

Document Name	Document Type	Document Date	Document Version
Debriefing-cleaned	Debriefing document	21/Dec/2017	
Items-clean	Online Survey	21/Dec/2017	
recruitment_clean	Recruitment Materials	08/Jan/2018	
STCI-LOI-cleaned	Written Consent/Assent	21/Dec/2017	

Documents Acknowledged:

Document Name	Document Type	Document Date	Document Version
conceptualmodel	Supplementary Tables/Figures		

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Research Ethics Officer on behalf of

NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).



Date: 13 June 2018

To: Dr. Donald Saklofske

Project ID: 111996

Study Title: Differential Item Functioning in State-Trait Cheerfulness Inventory Trait Form

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 06/Jul/2018

Date Approval Issued: 13/Jun/2018 13:37

REB Approval Expiry Date: 13/Jun/2019

Dear Dr. Donald Saklofske

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. All other required institutional approvals must also be obtained prior to the conduct of the study.

Documents Approved:

Document Name	Document Type	Document Date	Document Version
DONE_recruitment	Recruitment Materials		
REVISEDNOTTRACKED - 4.3 STCI-LOI-13012018finalversion-complete	Implied Consent/Assent		
RevisedNOTTracked - Debriefing-final	Debriefing document		
RevisedNOTTRACKED - Items_surveyMTURK	Online Survey		

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

_____, Research Ethics Officer on behalf of _____, NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).



Date: 22 November 2018

To: Dr. Donald Saklofske

Project ID: 112996

Study Title: The heart of humor and laughter traits. A Network Analysis

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 07/Dec/2018

Date Approval Issued: 22/Nov/2018 17:22

REB Approval Expiry Date: 22/Nov/2019

Dear Dr. Donald Saklofske

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. All other required institutional approvals must also be obtained prior to the conduct of the study.

Documents Approved:

Document Name	Document Type	Document Date	Document Version
DebriefingH	Debriefing document	Received October 26, 2018	
ItemPoolH	Online Survey	Received October 26, 2018	
LOI FinalH	Implied Consent/Assent	Received October 26, 2018	
RecruitmentH	Recruitment Materials	Received October 26, 2018	

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Research Ethics Officer on behalf of.

NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).



Date: 13 June 2018

To: Dr. Donald Saklofske

Project ID: 111928

Study Title: Psychometric Validation of the Sense of Coherence Scale Revised (SOC-R) and Sense of Coherence three item measure (SOC-3)

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 06/Jul/2018

Date Approval Issued: 13/Jun/2018 13:50

REB Approval Expiry Date: 13/Jun/2019

Dear Dr. Donald Saklofske

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Confirming Ethics Review.

This research study is to be conducted by the investigator noted above. All other required institutional approvals must also be obtained prior to the conduct of the study.

Documents Approved:

Document Name	Document Type	Document Date	Document Version
Initial_Debriefing	Debriefing document		
Initial_recruitment	Recruitment Materials		
notrack_ItemPool	Online Survey		
notrack_LOI-COMPLETED	Implied Consent/Assent		

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Research Ethics Officer on behalf of

NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).



Western Research

Date: 25 July 2018

To: Dr. Donald Saklofske

Project ID: 112226

Study Title: Psychometric Validation of the Sense of Humour Scale - Parallel Version Study

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 03/Aug/2018

Date Approval Issued: 25/Jul/2018 01:21

REB Approval Expiry Date: 25/Jul/2019

Dear Dr. Donald Saklofske

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. All other required institutional approvals must also be obtained prior to the conduct of the study.

Documents Approved:

Document Name	Document Type	Document Date	Document Version
Debriefing	Debriefing document		
ItemPool_Summary	Online Survey		
LOI Final_RevisionsNOTTRACK	Implied Consent/Assent		
recruitment	Recruitment Materials		

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 0000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

, Research Ethics Officer on behalf of]

NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).



Date: 22 May 2018

To: Dr. Donald Saklofske

Project ID: 111845

Study Title: Can I laugh it off? Investigating the role of humour in resiliency

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: June 1 2018

Date Approval Issued: 22/May/2018

REB Approval Expiry Date: 22/May/2019

Dear Dr. Donald Saklofske

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. All other required institutional approvals must also be obtained prior to the conduct of the study.

Documents Approved:

Document Name	Document Type	Document Date	Document Version
CheerResiliency_Items-SONApool	Online Survey		
DONE_recruitment	Recruitment Materials		
RevisedNOTracked_Debriefing	Debriefing document		
REVISEDNOTTRACKED_STCI-LOI-COMPLETED	Implied Consent/Assent		

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Research Ethics Officer on behalf of _____, NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).



Date: 10 August 2018

To: Dr. Donald Saklofske

Project ID: 112364

Study Title: Writing Task and State Questionnaires to Explore State Level Personalities related to Humor and Well-Being

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: 07/Sep/2018

Date Approval Issued: 10/Aug/2018 13:46

REB Approval Expiry Date: 10/Aug/2019

Dear Dr. Donald Saklofske

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. All other required institutional approvals must also be obtained prior to the conduct of the study.

Documents Approved:

Document Name	Document Type	Document Date	Document Version
DebriefingNOTTrack	Debriefing document		
LOIRevNOTTrack	Implied Consent/Assent		
recruitment	Recruitment Materials		
REVISED_combinedPDF	Online Survey		

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Research Ethics Officer on behalf of

NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).



Date: 25 January 2018

To: Dr. Donald Saklofske

Project ID: 110602

Study Title: Development and Psychometric Validation of State-Trait Cheerfulness Inventory - Trait Short Form

Application Type: NMREB Initial Application

Review Type: Delegated

Full Board Reporting Date: February 2 2018

Date Approval Issued: 25/Jan/2018

REB Approval Expiry Date: 25/Jan/2019

Dear Dr. Donald Saklofske

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the WREM application form for the above mentioned study, as of the date noted above. NMREB approval for this study remains valid until the expiry date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

This research study is to be conducted by the investigator noted above. All other required institutional approvals must also be obtained prior to the conduct of the study.

Documents Approved:

Document Name	Document Type	Document Date	Document Version
3.1 recruitment	Recruitment Materials	18/Dec/2017	
4.3 STCI-LOI-13012018finalversion-complete	Implied Consent/Assent		
Debriefing-final	Debriefing document	18/Dec/2017	
Items-SONApool-complete	Online Survey	18/Dec/2017	

No deviations from, or changes to the protocol should be initiated without prior written approval from the NMREB, except when necessary to eliminate immediate hazard(s) to study participants or when the change(s) involves only administrative or logistical aspects of the trial.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario. Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Please do not hesitate to contact us if you have any questions.

Sincerely,

Research Ethics Officer on behalf of

NMREB Chair

Note: This correspondence includes an electronic signature (validation and approval via an online system that is compliant with all regulations).

Appendix B

Individual Item Statistics and Factor Loadings for the STCI-T30

Item	Mean	SD	Skewness (SD)	Kurtosis (SD)	Item-rest Correlation	Factor Loading in a three-factor model (DWLS)
Cheerfulness						
14. I can easily unwind and enjoy the moment.	2.96	.83	-.52 (.10)	-.24 (.20)	.64	.70
16. Everyday life often gives me the occasion to laugh.	3.21	.76	-.72 (.10)	.14 (.20)	.62	.64
19. I have a “sunny” nature.	2.83	.83	-.49 (.10)	-.17 (.20)	.73	.76
22. I often smile.	3.20	.82	-.87 (.10)	.25 (.20)	.73	.73
30. I like to laugh and do it often.	3.29	.75	-.94 (.10)	.65 (.20)	.71	.71
32. I am a merry person.	2.76	.85	-.43 (.10)	-.32 (.20)	.79	.80
41. The good mood of others has a contagious effect on me.	3.13	.78	-.73 (.10)	.30 (.20)	.63	.66
46. I am often in a good mood, even without a specific reason.	2.83	.81	-.41 (.10)	-.21(.20)	.77	.83
50. I am often in a joyous mood.	2.84	.84	-.46 (.10)	-.25 (.20)	.81	.83
59. It is easy for me to spread good cheer.	2.96	.82	-.62 (.10)	.05 (.20)	.74	.78
Seriousness						

12. I plan my actions and make my decisions so that they are useful to me in the long run.	3.12	.72	-.63 (.10)	.54 (.20)	.52	.64
18. In my life, I like to have everything correct.	3.02	.74	-.38 (.10)	-.19 (.20)	.31	.33
23. In everything I do, I always consider every possible effect and compare all pros and cons carefully.	2.97	.76	-.41 (.10)	-.15 (.20)	.52	.61
28. In most situations, I initially see the serious aspect.	2.70	.77	-.19 (.10)	-.29 (.20)	.41	.40
42. I don't understand how others can waste their time on senseless matters.	2.32	.93	.26 (.10)	-.77 (.20)	.35	.35
47. I tend to plan far in advance and to set long-term goals for myself.	2.99	.88	-.57 (.10)	-.40 (.20)	.48	.62
49. Even seemingly trivial things have to be treated seriously and responsibly.	2.41	.83	-.09 (.10)	-.60 (.20)	.43	.45
52. I try to spend my free time doing things as useful as possible.	2.80	.80	-.21 (.10)	-.46 (.20)	.48	.57
58. When I communicate with other people, I always try to have an objective and sober exchange of ideas.	2.62	.81	-.26 (.10)	-.37 (.20)	.41	.42
60. One of my principles is: "first work, then play."	2.86	.85	-.32 (.10)	-.54 (.20)	.49	.60
Bad Mood						

11. Compared to others, I really can be grumpy and grouchy.	2.01	.92	.52 (.10)	-.64 (.20)	.64	.71
13. I often feel despondent.	2.00	.87	.59 (.10)	-.29 (.20)	.70	.71
24. When friends try to cheer me up by joking or fooling around, I sometimes become more morose and grumpy.	1.87	.84	.65 (.10)	-.23 (.20)	.54	.56
31. My mood is often not the best one.	2.13	.78	.44 (.10)	-.33 (.20)	.74	.79
34. Even if there is no reason, I often feel ill-humored.	1.93	.82	.55 (.10)	-.07 (.20)	.64	.65
37. I am often in a bad mood.	1.80	.81	.74 (.10)	-.15 (.20)	.79	.84
40. Sometimes I am distressed for a very long time.	2.27	.99	.22 (.10)	-1.02 (.20)	.68	.68
43. I am often sullen.	1.86	.86	.80 (.10)	.02 (.20)	.77	.79
48. I often feel so gloomy that nothing can make me laugh.	1.76	.87	.97 (.10)	.14(.20)	.72	.73
54. I am a rather sad person.	1.78	.92	.94 (.10)	-.09 (.20)	.76	.83

	χ^2/df	RMSEA	CFI	TLI	SRMR
Unidimensional	5.55	.088	.92	.91	.10
Two Factor Model (Cheerfulness vs. Bad Mood/Seriousness)	4.75	.080	.93	.93	.09
Three Factor Model (Cheerfulness, Seriousness, Bad Mood)	3.86	.069	.95	.94	.08

Note. Following recommendations of Schermelleh-Engel et al. (2003), the following fit indices were evaluated with the cut-off values: χ^2/df values of ≤ 2 and ≤ 3 are good and acceptable, respectively, comparative fit index (CFI) ≥ 0.97 and ≥ 0.95 as good and acceptable, respectively, root mean square error of approximation (RMSEA) ≤ 0.05 and ≤ 0.08 as good and acceptable, respectively, and standardized root mean square residual (SRMR) ≤ 0.05 and ≤ 0.10 as good and acceptable, respectively. Hu and Bentler (1999) suggested a Tucker Lewis Index (TLI) in the range of .90 and .95 would suggest moderate and excellent model fit, respectively.

Appendix C

The original STCI-S30 item set with theoretical origins from Ruch et al. (1997)

Factor	Cluster	N_{long}	N_{short}	Description	Item Number*	Example
CH	Cheerful	5	3	Tranquil and composed mood state directed inward	6 , 16, 21, 23 , 26	I am cheerful.
CH	Hilarity	5	3	Merry mood state that is shallow and directed outward	3, 8 , 11, 19 , 29	I am ready to have some fun.
SE	Earnest	3	2	Earnest mindset and set for serious things	2 , 18 , 28	I am in a serious frame of mind.
SE	Pensive	4	2	A serious frame of mind	5 , 7, 13 , 15	I am in a pensive frame of mind.
SE	Sober	3	2	A state of sober object-oriented thinking and soberly state of mind	10 , 22 , 30	I have a serious mental attitude.
BM	Sad	5	3	Despondent and distress mood	4 , 12, 17, 24 , 27	I feel gloomy.
BM	Ill-Humored	5	3	A state of sullen and grumpy or grouchy feelings	1, 9 , 14, 20 , 25	I am in a crabby mood.

Note. CH=cheerfulness, SE=seriousness, BM=bad mood. N_{long} = number of items in STCI-S30. N_{short} = number of items in STCI-S18.

*Item number is originated from STCI-S30. Bolded numbers were items selected for the short form STCI-S18.

Appendix D

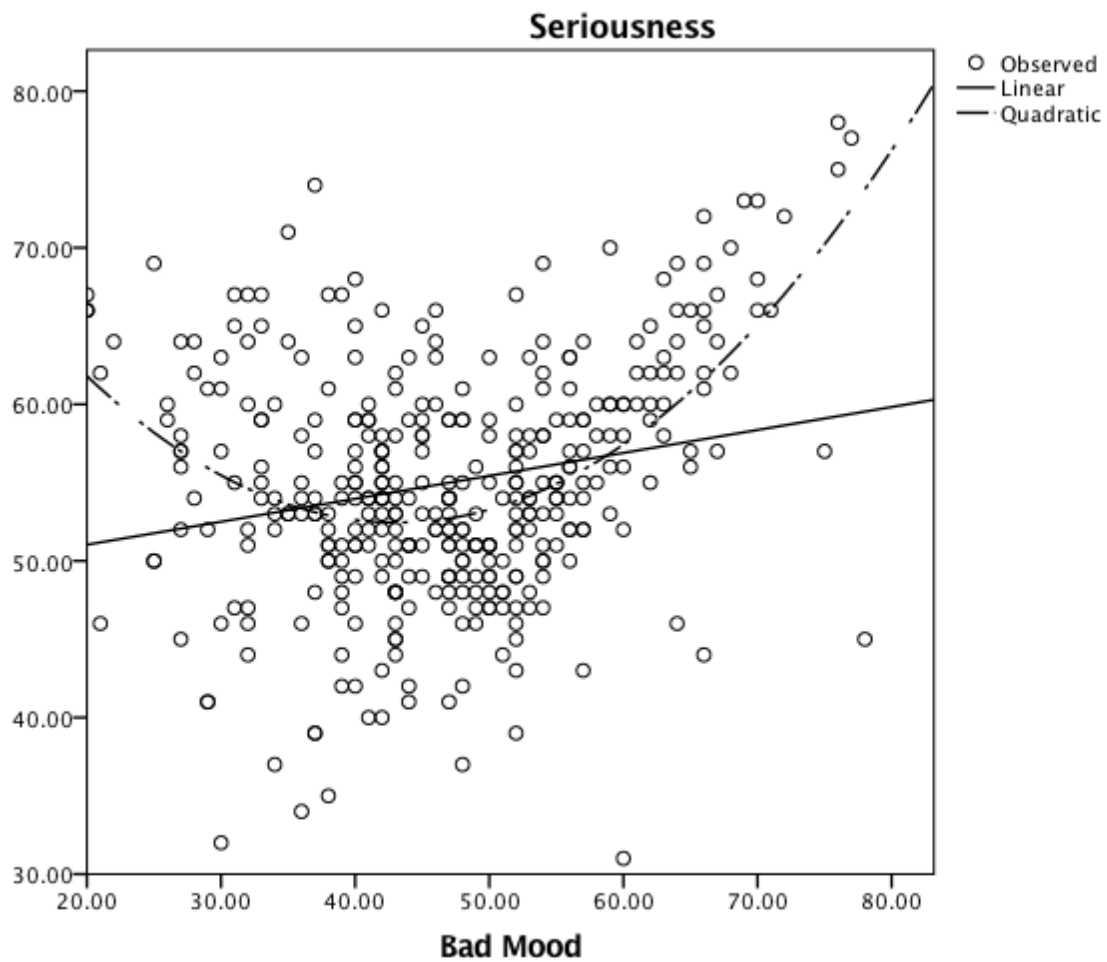
Closeness to unidimensionality assessment, item discrimination and category threshold estimates for the STCI-S18 state version in the construction sample

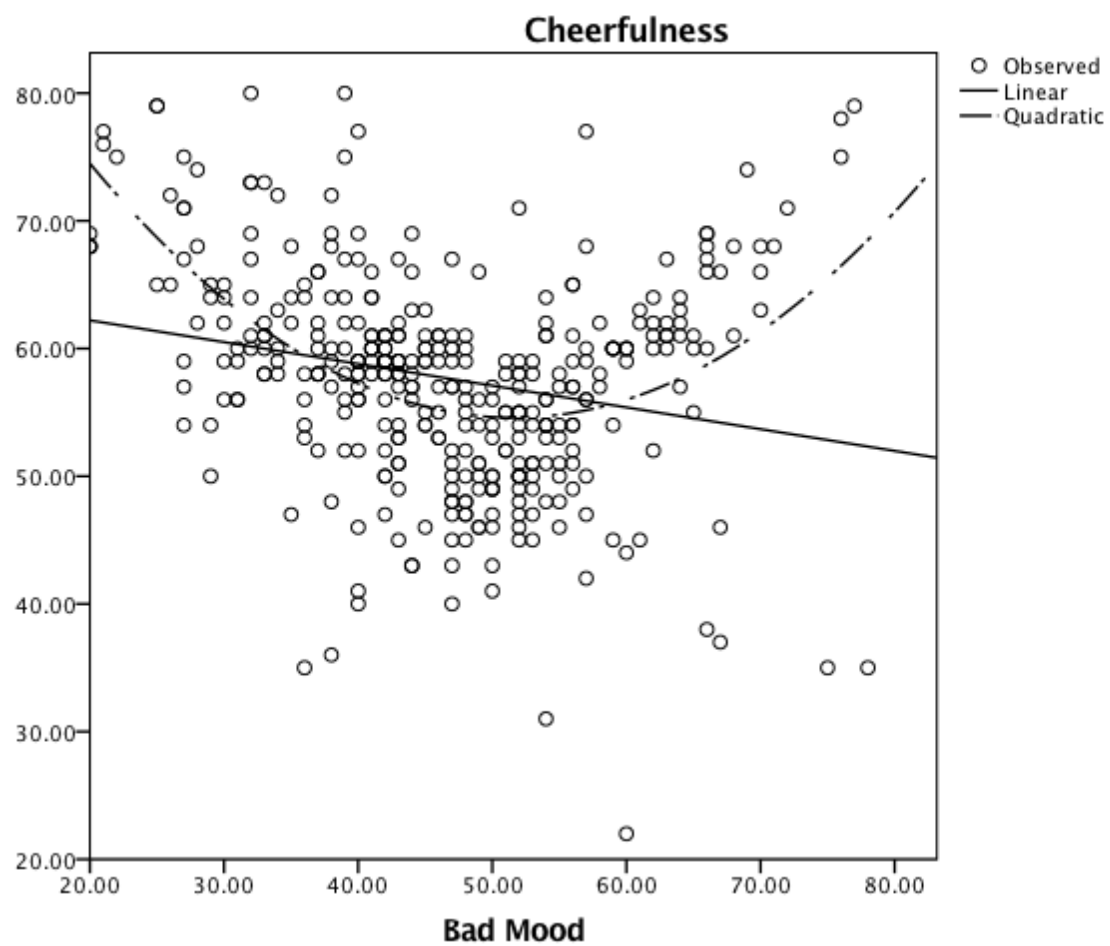
Item	I-UNICO	I-ECV	I-REAL	F[Bca CI]	<i>a</i>	<i>b</i>₁	<i>b</i>₂	<i>b</i>₃
Cheerfulness								
6. I am cheerful	1.00	.96	.17	.83 [.79, .87]	1.52	-2.04	-.58	0.91
8. I could laugh at the drop of a hat.	.75	.53	.69	.59 [.53, .65]	.73	-1.79	-.12	1.35
19. I am amused.	1.00	.99	.09	.81 [.76, .84]	1.36	-1.80	-.28	1.43
23. I'm walking on air.	1.00	.97	.11	.61 [.54, .66]	.76	-1.03	.77	2.66
26. I am delighted.	1.00	.92	.24	.83 [.78, .87]	1.47	-1.60	-.18	1.45
29. I am ready to have some fun.	1.00	1.00	.03	.61 [.56, .67]				
Seriousness								
2. I am set for serious things.	1.00	.95	.17	.72 [.66, .77]	1.04	-1.95	-.73	1.20
5. I have important things on my mind.	.94	.73	.33	.54 [.47, .60]	.64	-4.27	-2.62	<-0.01
10. I have a serious mental attitude.	.94	.72	.42	.64 [.56, .70]	.83	-1.32	.10	1.70

13. I am in a pensive frame of mind.	1.00	1.00	.01	.51 [.43, .58]	.60	-2.71	-.43	2.08
18. I am in a serious frame of mind.	1.00	.99	.07	.81 [.75, .85]	1.36	-1.66	-.41	1.31
22. I regard my situation objectively and soberly.	1.00	.98	.07	.47 [.39, .54]	.53	-3.73	-1.35	1.97
Bad Mood								
4. I am sad.	.98	.83	.40	.83 [.80, .86]	1.49	-.17	.88	1.98
9. I feel grouchy.	1.00	.94	.21	.83 [.80, .86]	1.51	-.26	.88	2.08
20. I am peeved.	.99	.90	.23	.68 [.62, .73]	.94	-.55	1.04	2.60
24. I feel gloomy	1.00	1.00	.04	.90 [.87, .93]	2.07	-.32	.62	1.83
25. I am in a crabby mood.	1.00	.95	.20	.89 [.86, .91]	1.93	-.17	.87	2.05
27. I feel dejected	1.00	.96	.17	.82 [.78, .86]	1.43	-.30	1.02	2.24

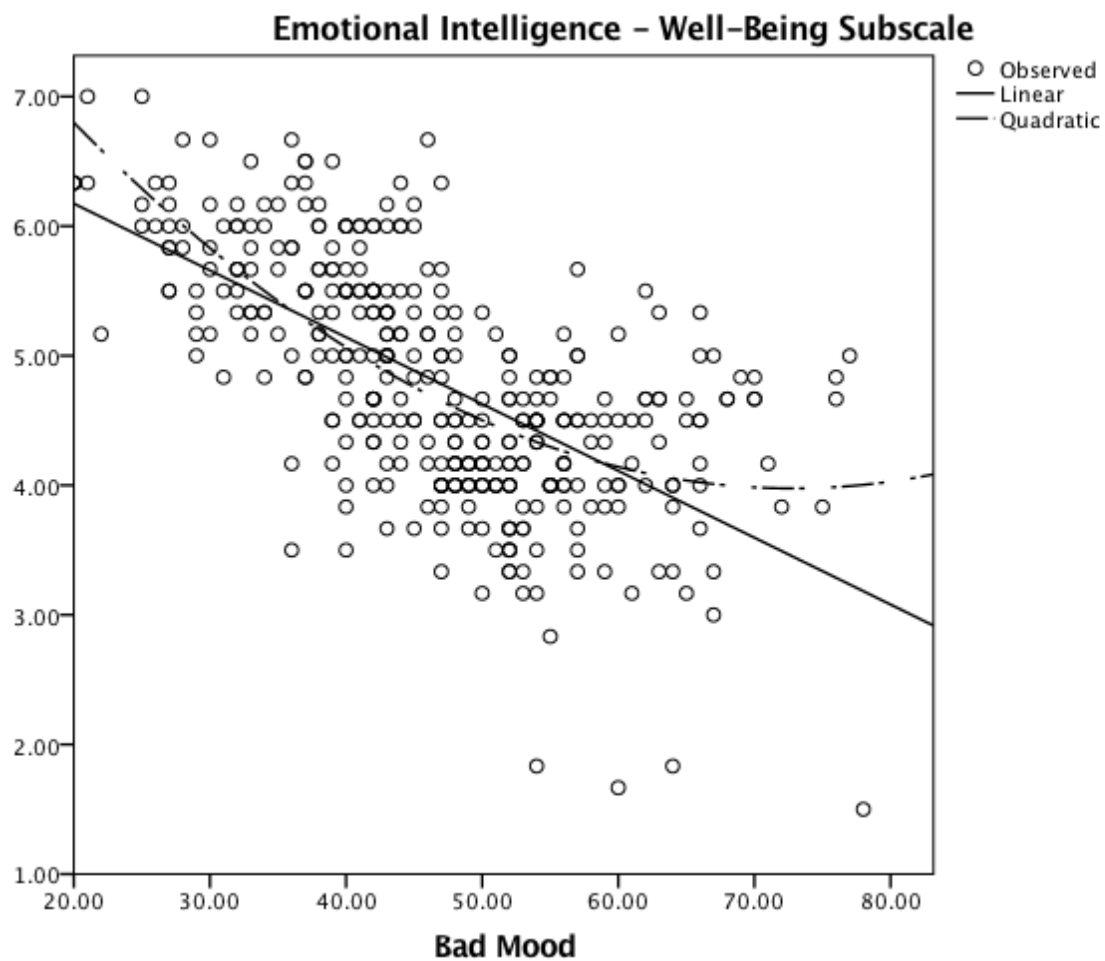
Note. $N=933$. Number indicates item position in the paper-pencil parent form of the State-Trait Cheerfulness Inventory – State Version Standard (STCI-S30). $F[Bca\ CI]$ =Factor loading with bias-corrected and accelerated bootstrap 95% confidence intervals for loading values. Fit was computed using Samejima's Graded Response Model. a = item discrimination parameter, b = category threshold parameter. I-Unico=Item Unidimensional Congruence. ECV=Explained Common Variance. I-REAL=Item RESidual Absolute Loadings.

Appendix E

Curvilinear Association between Bad Mood and Seriousness

Curvilinear Association between Bad Mood and Cheerfulness

Curvilinear Association between Bad Mood and Emotional Well-Being



Appendix F

Means, standard deviations, Cronbach alphas, and bivariate correlates between STCI-T60 and Personality

	<i>M</i>	<i>SD</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Cheerfulness	2.88	.43	<i>.91</i>							
(2) Seriousness	2.75	.38	.40**	.85						
(3) Bad Mood	2.33	.57	-.23**	.22**	.94					
(4) Extraversion	2.94	.75	.36**	.03	-.29**	.62				
(5) Agreeableness	3.63	.70	.29**	-.01	-.57**	.24**	.66			
(6) Conscientiousness	3.43	.69	.24**	.24**	-.43**	.18**	.38**	.50		
(7) Openness	3.45	.81	.07	-.06	-.51**	.17**	.52**	.32**	.71	
(8) Neuroticism	2.90	.73	-.39**	-.03	.51**	-.28**	-.15*	-.34**	-.12	.57

Note. $N = 371$. Cronbach alphas in diagonal are in *italics*. * $p < .01$ and ** $p < .001$ (adjusted level of significance to adjust for Type 1 error). Several Cronbach's alpha values were $< .70$ for personality dimensions. However, Cronbach's alpha is highly sensitive to number of items, and mean inter-item correlations could be calculated for constructs measured using less items (Pallant, 2005). Mean inter-item correlation values between .2 and .4 are optimal, with .1 and .5 as the lower and upper limit for acceptability, respectively (Briggs & Cheek, 1986). Mean inter-item correlations were .20, .32, .37, .28, and .25 for conscientiousness, agreeableness, openness to experience, extraversion, and neuroticism, respectively. All personality factors had interitem correlations ranging from .20 to .37, suggesting acceptable homogeneity levels for personality facets measured.

Appendix G

Chi square fit statistic, item discrimination (a) and category threshold (b_i) estimates) for the STCI-T60 Italian trait version

Item	S- χ^2 (df)	a	b₁	b₂	b₃
Cheerfulness					
2. My way of life can be described as positive and carefree.	94.97 (79)	1.23	-1.93	-0.27	1.94
4. I am a cheerful person.	39.28 (44)	2.69	-2.43	-0.88	0.61
9. I can be made to laugh easily.	65.24 (54)	2.03	-2.17	-0.97	0.43
14. I can easily unwind and enjoy the moment.	88.92 (81)	1.13	-2.20	-0.03	1.95
16. Everyday life often gives me the occasion to laugh.	59.29 (59)	1.59	-2.53	-0.89	0.89
19. I have a "sunny" nature.	65.75 (57)	2.56	-1.76	-0.66	0.62
22. I often smile.	55.36 (46)	2.78	-2.32	-0.88	0.45
25. Laughing has a contagious effect on me.	61.00 (53)	1.91	-2.43	-1.05	0.61
26. I often find that the small things in everyday life are really funny and amusing.	62.20 (62)	1.54	-2.59	-0.73	1.06
30. I like to laugh and do it often.	65.12 (44)	2.83	-2.24	-0.97	0.42
32. I am a merry person.	45.82 (45)	2.98	-1.91	-0.51	0.95
35. Many adversities of everyday life actually do have a positive side.	72.63 (87)	0.76	-3.63	-0.85	2.34
38. Many adversities of everyday life actually do have a positive side.	82.36 (54)	1.66	-3.21	-1.64	0.18
41. The good mood of others has a contagious effect on me.	76.37 (64)	1.36	-2.70	-1.06	0.96
44. I often find the slight mishaps of everyday life amusing, even if they happen to me.	117.99 (90)	0.77	-2.49	-0.20	2.62

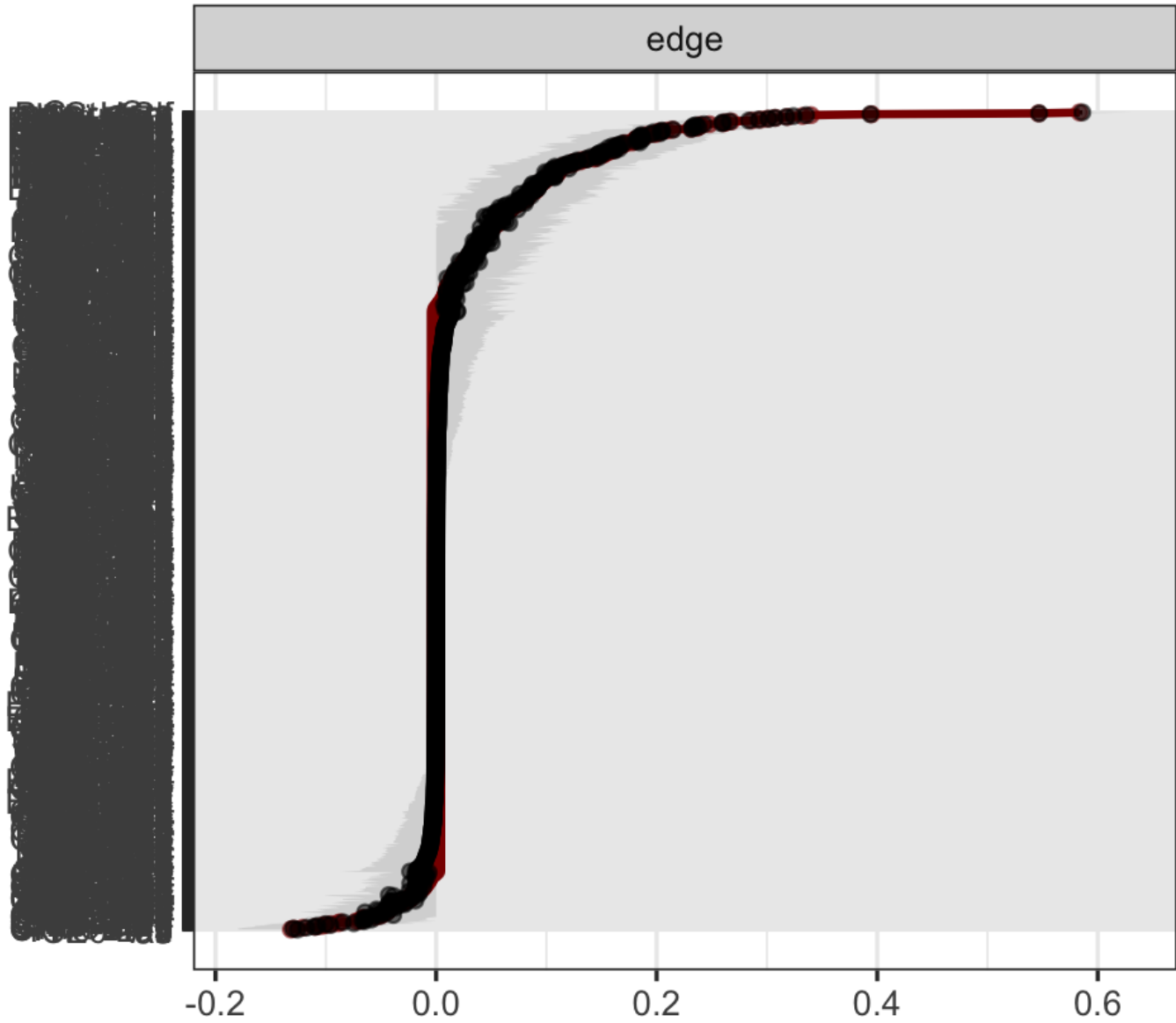
46. I am often in a good mood, even without a specific reason.	59.02 (63)	1.97	-1.73	-0.17	1.63
50. I am often in a joyous mood.	40.52 (44)	3.10	-1.84	-0.52	1.05
53. Experience has shown me that the proverb "Laughter is the best medicine" is really true.	75.89 (68)	1.49	-2.32	-0.90	0.61
57. I like to kid around with others.	63.60 (54)	1.63	-3.40	-1.90	-0.03
59. It is easy for me to spread good cheer.	48.05 (56)	1.96	-2.29	-0.65	0.95
Seriousness					
3. I very seldom act without a proper reason.	144.79 (83)	0.37	-4.90	-2.10	1.99
5. Most of my friends are more likely to be serious and reflective	54.34 (67)	0.79	-3.97	-1.94	0.60
7. I prefer conversations that deal with important things and are very profound	40.86 (53)	1.01	-3.87	-1.10	0.86
10. I find it unnecessary when people exaggerate in talking to me.	71.49 (71)	0.68	-4.47	-1.69	0.66
12. I plan my actions and make my decisions so that they are useful to me in the long run.	55.22 (59)	1.28	-2.93	-1.03	0.89
15. I am a serious person.	39.81 (46)	1.35	-3.35	-1.66	0.40
18. In my life, I like to have everything correct.	53.94 (54)	0.85	-4.41	-2.27	0.33
20. When I watch TV, I prefer informative reports to "shallow" programs.	111.93 (83)	0.49	-3.19	0.37	3.05
23. In everything I do, I always consider every possible effect and compare all pros and cons carefully.	61.00 (55)	1.49	-2.67	-1.00	0.82
28. In most situations, I initially see the serious aspect.	55.82 (60)	1.18	-2.74	-0.68	1.48
33. When I am in contact with others, I often find that I have thought many things through more thoroughly than they.	65.02 (61)	1.13	-3.13	-1.01	0.84
36. In conversation, I always avoid exaggerations, embellishments, and ambiguities, all of which do not contribute to the meaning of my statements.	80.32 (75)	0.64	-3.704	-0.73	1.93

39. My everyday life is filled mainly with important things and matters.	54.65 (56)	1.11	-3.38	-0.52	1.92
42. I don't understand how others can waste their time on senseless matters.	81.55 (75)	0.96	-2.18	-0.34	1.25
47. I tend to plan far in advance and to set long-term goals for myself.	75.10 (69)	1.09	-2.35	-0.52	1.05
49. Even seemingly trivial things have to be treated seriously and responsibly.	59.69 (67)	1.11	-2.36	-0.39	1.91
52. I try to spend my free time doing things as useful as possible.	74.36 (66)	0.95	-3.09	-0.79	1.64
55. I prefer people who communicate with deliberation and objectivity.	60.07 (47)	1.45	-3.29	-1.54	0.44
58. When I communicate with other people, I always try to have an objective and sober exchange of ideas.	47.58 (46)	1.71	-2.96	-1.24	0.75
60. One of my principles is: "first work, then play."	68.50 (69)	1.11	-2.36	-0.54	1.16
Bad Mood					
1. People often have reason to ask if something is eating me.	75.93 (93)	1.00	-1.10	0.86	2.83
6. Some annoying circumstances are capable of spoiling my mood for quite a while.	72.65 (81)	1.22	-2.48	-0.55	1.03
8. Sometimes I have the feeling of an inner emptiness.	120.53 (88)	1.42	-1.15	0.10	1.25
11. Compared to others, I really can be grumpy and grouchy.	89.71 (99)	0.98	-1.07	0.57	2.53
13. I often feel despondent.	89.66 (73)	2.02	-1.05	0.28	1.58
17. I often think, "For heaven's sake, don't bother me today."	88.13 (99)	1.00	-1.42	0.49	1.93
21. When I am distressed, even a very funny thing fails to cheer me up.	83.12 (101)	0.86	-2.07	0.35	2.23
24. When friends try to cheer me up by joking or fooling around, I sometimes become more morose and grumpy.	71.99 (74)	1.10	-0.08	1.56	3.27
27. There are many days on which I think, "I got up on the wrong side of bed."	65.03 (87)	1.50	-0.83	0.58	1.74
29. Sometimes I am sad without any reason.	81.38 (79)	1.86	-0.88	0.21	1.29
31. My mood is often not the best one.	63.35 (61)	2.64	-0.95	0.41	1.47

34. Even if there is no reason, I often feel ill-humored.	53.24 (49)	3.53	-0.24	0.78	1.53
37. I am often in a bad mood.	49.36 (44)	3.82	-0.19	0.92	1.72
40. Sometimes I am distressed for a very long time.	52.89 (65)	2.33	-0.44	0.68	1.67
43. I am often sullen.	52.49 (61)	1.78	-0.28	1.13	2.57
45. My acquaintances often get on my nerves.	62.72 (84)	1.22	-0.81	1.00	2.71
48. I often feel so gloomy that nothing can make me laugh.	44.99 (51)	2.58	0.18	1.267	2.18
51. If I am in a bad mood, I can't stand the presence of cheerful people.	81.37 (95)	1.04	-0.72	1.15	2.70
54. I am a rather sad person.	40.67 (47)	2.76	0.13	1.28	2.20
56. I often feel so weary that I cannot rouse myself to do anything.	83.55 (96)	1.18	-1.20	0.38	2.03

Note. Number indicates item position in the paper-pencil parent form (STCI-T60). Fit was calculated under Samejima's Graded Response Model. Due to the large sample size α was fixed at .001 for $S-X^2$. a = item discrimination parameter, b = category threshold parameter.

● Bootstrap mean ● Sample



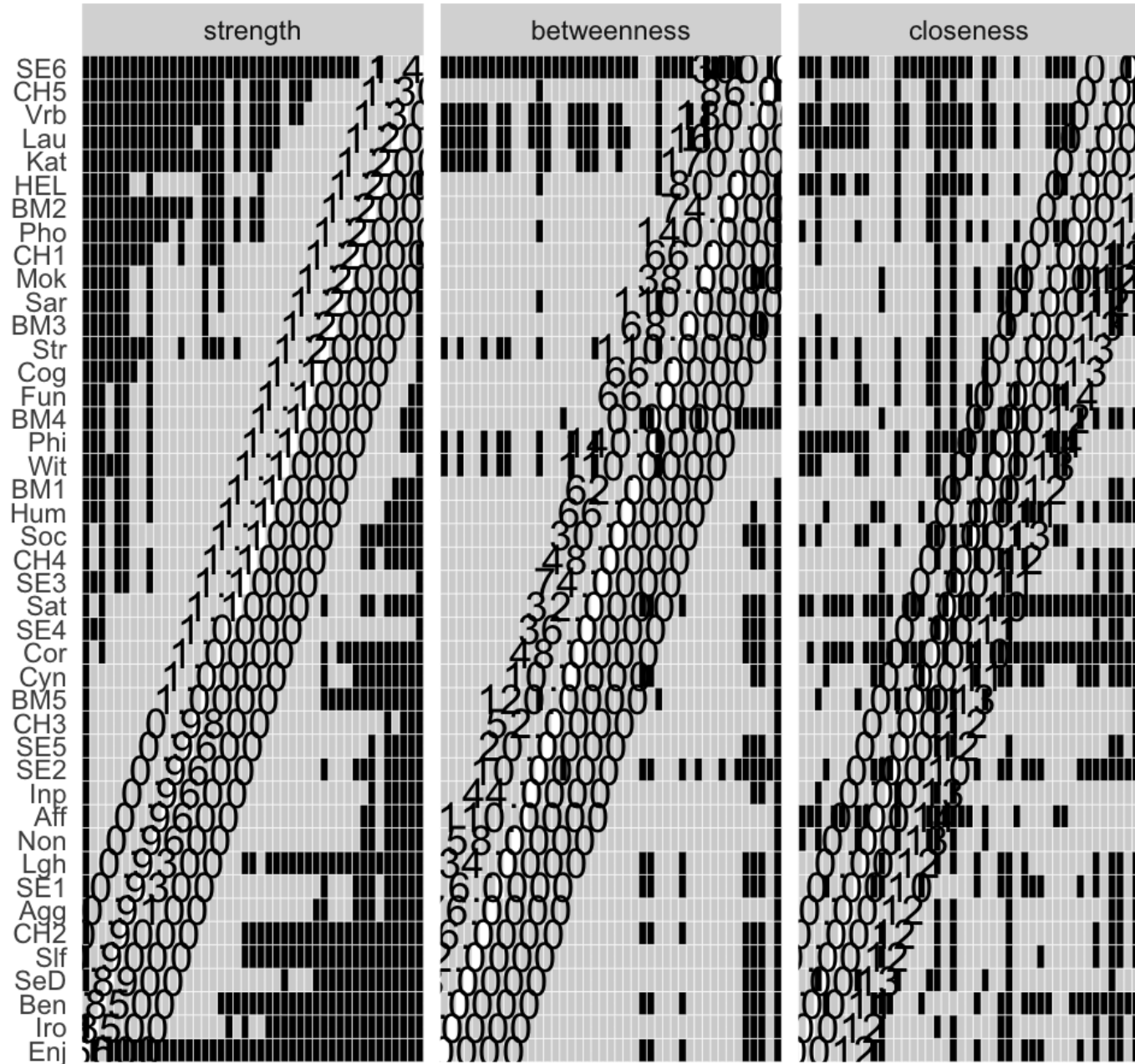


Figure 1. Network visualization of the 30 nodes for strength, betweenness, and closeness centrality. The nodes are arranged in a roughly circular pattern, with connections between them. The 'strength' panel shows the degree of each node, with values ranging from 1 to 4. The 'betweenness' panel shows the number of shortest paths between nodes that pass through each node, with values ranging from 1 to 140. The 'closeness' panel shows the average shortest path length from each node to all other nodes, with values ranging from 1 to 4.

Appendix I

Participants were asked to fill out questionnaires assessing personality, creativity, and write creative sentences. Creativity is assessed using Zhu et al.'s (2009) linguistic creativity measure in which participants are asked to “try to write a creative sentence about each keyword.”

Participants are provided with ten common words (sun, water, warm, eating, money, tasty, sea, beautiful, pain, fun; [http:// www.kuleuven.be/semlab/](http://www.kuleuven.be/semlab/); De Deyne & Storms, 2008; as cited in Tilburg, Sedikides, & Wildschut, 2015). Next, coders, unaware of study hypotheses, will code the sentences for creativity on the item: “How witty do you consider this sentence to be?” (1 = not at all, 5 = very much), originality “How original do you consider this sentence to be? (1 = not at all, 5 = very much), and humour “to what extent did the individual use humour in their sentence? (0 = no evidence of humour 1 = little humour 2 = some humour/lots of humour)”

Coding Scheme for the Wittiness and Originality Scoring of the Creativity Sentences Generated by Participants in the Creativity

Score	Level	Wittiness coding scheme	Originality coding scheme
5	Very high	Skilled play with ambiguities; creates thrilled surprise; invented additional information and details give the sentence an unexpected twist; artistically plays with sense and nonsense	Based on unusual associations that make sense; has an indirect or remote, but meaningful relation to the key word provided; interprets the key word in relation to an abnormal context
4	High	Is characterized by fascinating absurdity; successful word plays; wittily reverses expectations; matching transfer of absurd concepts; plays effectively with stereotypes	Skillfully combines aspects of the word with the sentence; thinks outside the box; overrides dominant impressions
3	Medium	Effectively represents physically impossible and unrealistic things; shows new and astonishing perspectives	Interprets the stimulus in an abstract, but still obvious way; chooses a form that is suggested by the stimulus; does not much think out of the box
2	Low	Unrealistic things and overstatements/understatements seem profane/ordinary; reinterpreting or applying idioms and word plays does not create surprise; idea is not effective or is only adumbrated due to lack of elaboration	Hardly disengages from dominant stimuli; does not transcend closely related terms and associations; lack of elaboration that only adumbrates the meaningful relationship of the unusual associations with the stimulus
1	Very low	Relationship of key word and sentence is not convincing; describes real facts according to expectations; sheer reproduction of the depicted situation without an element of surprise	Only describes the stimulus; the writing along with the stimulus does not make sense and creates incomprehension
N/A	Missing	Responses that did not comply to the instructions (e.g., “without words”, “can’t think of anything”, “(not) funny”, “no comment”, “cfgzcfz”)	

Appendix J

Descriptive statistics and correlations of cheerfulness, self/everyday creativity, and flourishing from Study Eight

Variable	<i>M</i>	<i>SD</i>	1				2				3			
			<i>r</i>	<i>p</i>	LLCI	ULCI	<i>r</i>	<i>p</i>	LLCI	ULCI	<i>r</i>	<i>p</i>	LLCI	ULCI
1. Cheerfulness	62.88	8.75												
2. Self/Everyday Creativity	3.69	.54	.49***	< .001	.42	.54								
3. Flourishing	5.69	.90	.62***	< .001	.57	.67	.48***	< .001	.41	.54				

Note. $N = 620$. * $p < .05$, ** $p < .01$, *** $p < .001$. LLCI indicates Lower 95% Confidence Interval, and ULCI indicates Upper 95% Confidence Interval.

Appendix K

Rubric provided for Blind Judges

Instructions for Blind Peer Coders

Participants were asked to fill out questionnaires assessing personality and write responses to an email. Creativity is assessed using Howrigan & MacDonald (2008) Humour Response Task in which participants were asked the following:

For this task, I want you to imagine that you've just received an e-mail by a fellow student asking if you could write some responses to the questions posed below. Your fellow student mentions that this is for a school project on the diversity of humorous responses, and asks that you try to write something funny for each question.

Please write at least 5-7 sentences and do not provide any identifying information (e.g., names of people you know or yourself, address, phone number).

1. *"If you could experience what it's like to be a different kind of animal for a day, what kind of animal would you not want to be, and why?"*
2. *"How would you make a marriage exciting after the first couple of years?"*
3. *"What do you think the world will be like in a hundred years?"*

Your job as the coder, unaware of study hypotheses, will code the content for creativity on the item: "How witty do you consider this response to be?" (1 = not at all, 5 = very much), originality "How original do you consider this response to be? (1 = not at all, 5 = very much), and use of lighthearted and mockery styles of humour "to what extent did the individual use humour in their sentence? (0 = no evidence of humour 1 = little humour 2 = some humour/lots of humour)".

Coding Scheme for the Wittiness and Originality Scoring of the Responses Generated by Participants in the Creativity Task (please note: ; refers to OR, it does not need every criteria in the box to meet for a score)

Score	Level	Wittiness coding scheme	Originality coding scheme
5	Very high	Skilled play with ambiguities; creates thrilled surprise; invented additional information and details give the response an unexpected twist; artistically plays with sense and nonsense	Based on unusual associations that make sense; has an indirect or remote, but meaningful relation to the content provided; interprets the content in relation to an abnormal context
4	High	Is characterized by fascinating absurdity; successful word plays; wittily reverses expectations; matching transfer of absurd concepts; plays effectively with stereotypes	Skillfully combines aspects of the content that at first glance seems unrelated; thinks outside the box; overrides dominant impressions
3	Medium	Effectively represents physically impossible and unrealistic things; shows new and astonishing perspectives	Interprets the stimulus in an abstract, but still obvious way; choses a form that is suggested by the stimulus; does not much think out of the box
2	Low	Unrealistic things and overstatements/understatements seem profane/ordinary; reinterpreting or applying idioms and word plays does not create surprise; idea is not effective or is only adumbrated due to lack of elaboration	Hardly disengages from dominant stimuli; does not transcend closely related terms and associations; lack of elaboration that only adumbrates the meaningful relationship of the unusual associations with the stimulus
1	Very low	Relationship of content and response is not convincing; describes real facts according to expectations; sheer reproduction of the depicted situation without an element of surprise	Only describes the stimulus; the writing along with the stimulus does not make sense and creates incomprehension
N/A	Missing	Responses that did not comply to the instructions (e.g., "without words", "can't think of anything", "(not) funny", "no comment", "cfgzcfz")	

Light hearted Rating: To what extent *did the individual use lighthearted humour in their response?*

Definition (could include the following): Mindfully detecting the incongruities in life, the capacity to describe them, and the relaxedness to deal with them in a lighthearted way; good-natured kidding, brightening others up, indulging in gibberish talk, and playing with meaning, sense and nonsense; shows wit, humor, fun, and/or nonsense

0=no evidence of lighthearted humour

1= little lighthearted humour used

2= some lighthearted humour/lots of lighthearted humour

Mockery Styles of Humour Rating

Definition: having malicious, mean-spirited goals and attitudes; intentions of hurting other people; demonstrating superiority, shows cynicism, sarcasm, satire, and/or irony

To what extent *did the individual use mockery styles of humour in their response?*

0=no evidence of humour

1= little humour used

2= some humour/lots of humour

Appendix L

Variable	<i>M</i>	<i>SD</i>	1		2		3		4		5		6		7	
			<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀	<i>r</i>	<i>BF</i> ₁₀
1. Cheerfulness	3.13	.46														
2. Seriousness	2.72	.34	-.19	>3												
3. Bad Mood	2.15	.53	-.65	>100	.28	>100										
4. Rater Light.	.50	.36	-.04	<1	-.12	<1	.00	<1								
5. Rater Mock.	.35	.29	-.21	>10	-.04	<1	.10	<1	.54	>100						
6. Rater Origin.	2.83	.56	-.05	<1	-.08	<1	.00	<1	.87	>100	.61	>100				
7. Rater Wit	2.37	.59	-.10	<1	-.09	<1	.02	<1	.90	>100	.71	>100	.96	>100		

Note. $N = 234$. r represents Pearson's r and BF_{10} indicates Bayes Factors where evidence of alternative hypotheses can be interpreted with 1–3 as weak, 3–10 as substantial, 10–30 as strong, 30–100 as very strong, and >100 as decisive. Rater Light = rating of lightheartedness, Rater Origin = rating of originality, Rater Wit = rating of wittiness.

CURRICULUM VITAE

Chloe Lau, MSc.

EDUCATIONAL HISTORY

Doctor of Philosophy, Clinical Science and Psychopathology, Western University	2017–2022
CPA Accredited Clinical Psychology Program	
Advisor: Dr. Donald H. Saklofske	
Predoctoral Clinical Psychology Residency	2021–2022
Ontario Shores Centre for Mental Health Sciences	
CPA Accredited Predoctoral Clinical Psychology Program	
Master of Science, Clinical Science and Psychopathology, Western University	2015–2017
CPA Accredited Clinical Psychology Program	
Advisors: Dr. Donald H. Saklofske & Dr. Shannon Stewart	
Bachelors of Science (Honours), McMaster University	2011–2015
Major: Psychology, Neuroscience, and Behaviour	
Honours Thesis Advisor: Dr. Randi McCabe	

INTERNATIONAL RESEARCH VISITS

Visiting Researcher, University of Florence, Italy	May–October 2018
Advisor: Professor Dr. Francesca Chiesi	
Visiting Researcher, University of Zurich, Switzerland	September–December 2017
Advisor: Professor Dr. Willibald Ruch	

GRANT FUNDING, SCHOLARSHIPS, AND AWARDS (EXTERNAL COMPETITION)

Ontario Graduate Scholarship Doctoral Award (Value: \$15,000 for one year)	2021–2022
Province and Ontario and Ontario Universities	
Description: Awarded based on academic merit and research proposal	
Joseph-Armand Bombardier Doctoral Scholarship (Value: \$ 105,000 over 3 years)	2017–2020
Canada Graduate Scholarships, Social Sciences and Humanities Research Council	
Description: National award for academic merit and research proposal for PhD	
Candidates in Social Sciences and Humanities	
Mitacs Research Training Award (Value: \$6000)	2020
Mitacs, Canadian Network of Centre of Excellence	
Description: Awarded based on academic merit and proposal to conduct a three-month research project	
SSHRC Storytellers Contest Honorary Mention Award (Value: \$1000)	2019

Social Sciences and Humanities Research Council

Description: Honorary award for video submission to the Storytellers Contest

RISE Research Award Honorary Mention (Value: \$100) 2019

Association for Psychological Sciences (APS)

Description: Honorary award for poster presentation session at APS

Association for Psychological Science Travel Award (Value: \$200) 2019

Association for Psychological Science (APS)

Description: Complimentary convention registration and monetary award for successful application

Mitacs Globalink Research Award (Value: \$6000) 2018

Mitacs, Canadian Network of Centre of Excellence

Description: Awarded to conduct an international research visit at the University of Florence, Italy.

Canada Graduate Scholarship Michael Smith Foreign Supplement (Value: \$6000) 2017

Canada Graduate Scholarships, Social Sciences and Humanities Research Council

Description: Awarded to conduct a research stay at the University of Zurich, Switzerland

Ontario Graduate Scholarship Doctoral Award (Value: \$15,000 for one year) – Declined 2017

Province and Ontario and Ontario Universities

Description: Awarded based on academic merit and research proposal

ThinkSwiss Scholarship 2017 (Value: 4800 CHF) 2017

Embassy of Switzerland in the United States of America

Description: Awarded to conduct a research stay at the University of Zurich, Switzerland

Best Research Day Poster Award (Graduate Clinical/Education Section; Value: \$150) 2017

Department of Psychiatry & Behavioural Neurosciences 2017 Research Day Conference

Description: Awarded for the most outstanding abstract & poster presentation and invited to give a talk at the Hospital Rounds

Best Student Conference Presentation Award Runner-up (Value: \$100) 2017

Clinical Psychology Section, 2017 Canadian Psychological Association Conference

Description: Awarded for runner-up poster presentation in clinical psychology

Joseph-Armand Bombardier Master's Scholarship (Value: \$17,500) 2016–2017

Social Sciences and Humanities Research Council of Canada

Description: Awarded based on academic merit and research proposal

GRANT FUNDING, SCHOLARSHIPS, AND AWARDS (INTERNAL COMPETITION)**Best Business Plan Award (Value: \$500)** 2020

Graduate Student Innovation Scholars, WORLDdiscoveries, Western University

Description: Awarded for best business plan in commercialization of new technology

- Graduate Student Innovation Scholars Award (Value: \$500)** 2020
 WORLDiscoveries, Western University
 Description: Awarded to participate in an entrepreneurial learning program to develop expertise in entrepreneurship, commercialization and knowledge transfer with hands-on training
- Mary Ann Underwood Small Global Opportunities Award (Value: \$2000)** 2018
 International Learning, Office of the Registrar, Western University
 Description: Awarded for academic achievement in global ambassadors at Western University
- Faculty of Social Science Graduate Research Award Fund (Value: \$200)** 2018–2019
 Western University
 Awarded to Principal Investigator: Chloe Lau
 Description: Awarded based on academic merit and research proposal
- PSAC Local 610 Academic Achievement Scholarships (Value: \$400)** 2017
 PSAC Local 610 of Western University
 Description: Awarded based on academic merit and research contributions
- Faculty of Social Sciences Graduate Research Award Fund (Value: \$400)** 2017–2018
 Western University
 Awarded to Principal Investigator: Chloe Lau
 Description: Awarded based on academic merit and research proposal
- Faculty of Social Sciences Graduate Research Award Fund (Value: \$375)** 2016–2017
 Western University
 Awarded to Principal Investigator: Chloe Lau
 Description: Awarded based on academic merit and research proposal
- University Senate Scholarships (Value: \$800)** 2014–2015
 Faculty of Science, McMaster University
 Description: Awarded to the 90th percentile of undergraduate students in the Faculty of Science based on cumulative average
- University Senate Scholarships (Value: \$800)** 2013–2014
 Faculty of Science, McMaster University
 Description: Awarded to the 90th percentile of undergraduate students in the Faculty of Science based on cumulative average
- Dean's Honour List** 2011–2015
 McMaster University
 Description: Awarded to undergraduate students with an A- to A+ cumulative average

University Entrance Scholarships (\$750)

2011–2012

McMaster University

PEER REVIEWED PUBLICATIONS

Peer Reviewed Articles

1. **Lau, C.**, Chiesi, F., & Saklofske, D.H. (in press). The state-trait model of cheerfulness: Tests of measurement invariance and latent mean differences in European and Chinese Canadian students. Manuscript accepted in *Europe's Journal of Psychology*.
2. **Lau, C.**, Stewart, S. L., Saklofske, D. H., & Hirdes, J. (2021). Development and psychometric validation of the interRAI ChYMH externalizing subscale. *Clinical Child Psychology and Psychiatry*, 26(1), 295–305.
3. Chiesi, F., Bonacchi, A., **Lau, C.**, Tosti, A.E., Marra, F., & Saklofske, D.H. (2020). Measuring self-control across gender, age, language, and clinical status: A validation study of the Italian version of the Brief Self- Control Scale (BSCS). *PloS one*, 15(8), e0237729.
4. **Lau, C.**, Chiesi, F., Hofmann, J., Ruch, W., & Saklofske, D.H. (2020). Development and linguistic cue analysis of the state-trait cheerfulness inventory – short form. Advance online publication in *Journal of Personality Assessment*.
5. **Lau, C.**, Chiesi, F., Ruch, W., & Saklofske, D.H. (2020). Is cheerfulness and satisfaction with life mediated by self-esteem and behavioral activation? A serial mediation model. Advance online publication in *Personality and Individual Differences*.
6. Hofmann, J., Platt, T., **Lau, C.**, & Torres-Marin, J. (2020). Gender differences in humor traits, appreciation, production, comprehension, (neural) responses, use, and correlates: A systematic review. Advance online publication in *Current Psychology*.
7. Chiesi, F., **Lau C.**, Marunic, G., Sanchez-Ruiz, M.J., Plouffe, R. A., Topa, G., Yan, G., & Saklofske D. H. (2020). Emotional intelligence in young women from five cultures: A TEIQUÉ-SF invariance study using the omnicultural composite approach inside the IRT framework. Advance online publication in *Personality and Individual Differences*.
8. Chiesi, F., **Lau, C.**, & Saklofske, D.H. (2020). A revised short version of the Compassionate Love Scale for Humanity (CLS-H-SF): Evidence from Item Response Theory Analyses and Validity Testing. *BMC Psychology*, (8), 20.
9. Chiesi, F., Marunic, G., & **Lau, C.** (2020). Validation study of an Italian version of the revised Sense of Coherence Scale (SOC-R). Advance online publication in *Current Psychology*.
10. **Lau, C.**, Chiesi, F., Saklofske, D.H., Yan, G., & Li, C. (2020). How essential is the essential resilience scale? Differential item functioning for Chinese and English versions. *Personality and Individual Differences*, 155, 10966.

11. Heintz, S., Ruch, W., [et al., including **Lau, C.**]. (2020) Benevolent and corrective humor, life satisfaction, and broad humor dimensions: Extending the nomological network of the BenCor across 25 countries. *Journal of Happiness Studies*, 21, 2473–2492.
12. Plouffe, R. A., Dave, H. P., Wilson, C. A., Topa, G., Riggin, A., **Lau, C.**, Sinclair, V., Saklofske, D. H., & Prince-Embury, S. (2019). Validation of the resiliency scale for young adults – Spanish version. Advance online publication in *European Journal of Psychological Assessment*.
13. **Lau, C.**, Chiesi, F., Hofmann, J., Ruch, W., & Saklofske, D.H. (2019). The Italian version of the state-trait cheerfulness inventory trait form: Psychometric validation and evaluation of measurement invariance. Advance online publication in *Journal of Psychoeducational Assessment*.
<https://doi.org/10.1177/0734282919875639>
14. **Lau, C.**, Chiesi, F., & Saklofske, D.H. (2019). The combinative role of traits cheerfulness and seriousness in predicting resiliency and well-being: A moderated mediation model. Advance online publication in *Personality and Individual Differences*, 151, 109515.
<https://doi.org/10.1016/j.paid.2019.109515>
15. **Lau, C.**, Stewart, S. L., Saklofske, D. H., & Hirdes, J. (2019). Scale development and psychometric properties of internalizing symptoms: The interRAI child and youth mental health internalizing subscale. *Psychiatry Research*, 278, 235–241. <https://doi.org/10.1016/j.psychres.2019.06.013>
16. **Lau, C.** (2019). Book Review: Essentials of assessment report writing by Schneider, W. J., Lichtenberger, E. O., Mather, N., & Kaufman, N. *Canadian Journal of School Psychology*, 34(4), 323–327. <https://doi.org/10.1177/0829573519852490>
17. **Lau, C.**, Chiesi, F., Saklofske, D.H., & Yan, G. (2019). What is the temperamental basis of humour like in China? A cross-national examination and validation of the standard version of the state–trait cheerfulness inventory. *International Journal of Psychology*, 55(2), 264–272.
<https://doi.org/10.1002/ijop.12582z>
18. **Lau, C.**, Feher, A., Wilson, C. A., Babcock, S. E., & Saklofske, D. H. (2018). Resiliency, meaning in Life, and life satisfaction: An examination of moderating effects. *Acción Psicológica*, 15(2), 5–14.
<https://doi.org/10.5944/ap.15.2.22256>
19. **Lau, C.**, Stewart, S.L., Sarmiento, C., Saklofske, D.H., & Tremblay, P. (2018). Who is at risk for problematic video gaming? Risk factors in problematic video gaming in clinically referred Canadian children and adolescents. *Multimodal Technologies and Interactions*, 2, 19.
20. **Lau, C.**, Ford, J., Van Lieshout, R.J., Saperson, K., McConnell, M.M., & McCabe, R. (2018) Enhancing mentorship in psychiatry: A study investigating needs and preferences in the development of a mentoring program. *J Multidisciplinary Scientific Journal*, 1(1), 3; 8–18. doi:[10.3390/j1010003](https://doi.org/10.3390/j1010003)
21. **Lau, C.**, Stewart, S. L., Saklofske, D. H., Tremblay, P. F., & Hirdes, J. (2018). Psychometric evaluation of the interRAI child and youth mental health disruptive/aggression behaviour scale (DABS) and hyperactive/distraction Scale (HDS). *Child Psychiatry & Human Development*, 49(2), 279–289.

22. Babcock, S. E., Wilson, C. A., & **Lau, C.** (2018). Test Review: School Motivation and Learning Strategies Inventory (SMALSI): College Form [Manual] by Stroud, K. C., & Reynolds, C. R. *Canadian Journal of School Psychology*, 33(2), 150–157.
23. **Lau, C.**, Ford, J., Van Lieshout, R. J., Saperson, K., McConnell, M., & McCabe, R. (2016). Developing mentoring competency: Does a one session training workshop have impact?. *Academic Psychiatry*, 40(3), 429–433.

Book Chapters

24. **Lau, C.**, & Forchuk, C. (2020). Hopelessness. In B. J. Carducci (Editor-in-Chief) & A. Di Fabio, D. H. Saklofske, & C. Stough (Vol. Eds.), *The Wiley-Blackwell encyclopedia of personality and individual differences: Vol. III. Personality processes and individual differences*. Hoboken, NJ: John Wiley & Sons.
25. Sarmiento, C. & **Lau, C.** (2020). Diagnostic and Statistical Manual of Mental Disorders, 5th Ed.: DSM-5. In B. J. Carducci (Editor-in-Chief) & A. Di Fabio, D. H. Saklofske, & C. Stough (Vol. Eds.), *The Wiley-Blackwell encyclopedia of personality and individual differences: Vol. III. Personality processes and individual differences*. Hoboken, NJ: John Wiley & Sons.
26. Tohver, G., & **Lau, C.** (2020). Genius, personality correlates of. In B. J. Carducci (Editor-in-Chief) & A. Di Fabio, D. H. Saklofske, & C. Stough (Vol. Eds.), *The Wiley-Blackwell encyclopedia of personality and individual differences: Vol. III. Personality processes and individual differences*. Hoboken, NJ: John Wiley & Sons.
27. Van Ameringen, M., Turna, J., Patterson, B., & **Lau, C.** (2015). Pharmacotherapy for adolescent social phobia. In K. Ranta, M. Marttunen, L-J. García-Lopez, and A. M. La Greca (Eds.), *Social anxiety and phobia in adolescents - Development, manifestation and intervention strategies* (pp.301–322). Powell, WY: Springer International Publishing.

CONFERENCE PRESENTATIONS

Symposium and Oral Presentations at Conferences (Refereed)

- Li, C.*, **Lau, C.**, Yosopov, L., & Saklofske, D. H. (2020, November). The seriousness of humour: examining the relationship and pathways between sexist humour and dark tetrad traits. Invited keynote presentation at the Undergraduate Awards Global Summit, Dublin, Ireland. (Virtual, live event cancelled due to restrictions of COVID-19)
* indicates co-supervised undergraduate thesis student
- Lau, C.**, Chiesi, F., Saklofske, D., & Yan, G. (2019, May). A cross-cultural comparison on the state-trait model of cheerfulness in Canada and China. In S. Heintz (Chair), *Humor as a temperament, intervention, stimulus, and trait: An interdisciplinary perspective on the psychology of humor*. Symposium conducted at the Association for Psychological Science, Washington, D.C.

3. **Lau, C.,** Ford, J., Van Lieshout, R., Saperson, K., & McCabe, R. (2019, March). Mentoring programs for education. In M. Atkin (Chair), *Addressing Wellness*. Symposium conducted at the Robert MacMillan Symposium for Education, London, Ontario.
4. **Lau, C.,** Ford, J., Van Lieshout, R., Saperson, K., & McCabe, R. (2018, September). Mentoring for multidisciplinary practitioners in mental health: Findings on mentoring initiatives in promoting healthier organizations. In A. Tsuda (Chair), *Multidisciplinary approach for healthy workers*. Symposium conducted at the Second International Cross-Cultural Conference Healthier Societies Fostering Healthy Organizations, Florence, Italy.
5. **Lau, C.,** Chiesi, F., Hofmann, J., Ruch, W., & Saklofske, D.H. (2018, September). Findings in the state trait cheerfulness English short form and cross-cultural metric of cheerfulness across four cultures. In J. Hofmann (Chair), *Measuring the temperamental basis of the sense of humor: the relationships of the state-trait model of cheerfulness and well-being and its kin*. Symposium conducted at the Second International Cross-Cultural Conference Healthier Societies Fostering Healthy Organizations, Florence, Italy.
6. **Lau, C.,** Stewart, S.L., Saklofske, D.H., & Hirdes, J. (2017, October). *Development and Psychometric Validation of the Internalizing and Externalizing Subscales on the interRAI ChYMH*. Podium presentation presented at the 6th European Conference on Mental Health, Berlin, Germany.
7. **Lau, C.,** Ford, J., Van Lieshout, R., Saperson, K., & McCabe, R. (2017, May). *Mentoring in Psychiatry: Preliminary Findings on the Effects of Curriculum-Guided Mentoring on Mentee Development*. Invited Keynote Presentation, presented at the Mental Health and Addiction Hospital Rounds at St. Joseph's Healthcare West 5th Campus, Hamilton, ON.
8. **Lau, C.,** Stewart, S.L., & Saklofske, D.H. (2017, May). *New Developments in Measurement of Latent Traits*. Podium presentation presented at the Western-Waterloo-Laurier Social Psychology Conference, London, ON.
9. Van Ameringen, M., Patterson, B., Turna, J., & **Lau, C.** (2015, April). *Mental health apps: where to start*. Invited Keynote presentation, presented at the meeting of the Anxiety and Depression Association of America (ADAA) Annual Conference, Philadelphia, PA.
10. Van Ameringen, M., Patterson, B., Turna, J., & **Lau, C.** (2014, November). *Using phone applications to treat anxiety*. Invited key note presentation, presented at the meeting of the International Anxiety Disorders Society Annual Conference, Melbourne, Australia.

Poster Presentations (Refereed)

1. Stewart, S. L. & **Lau, C.** (2020, May). *Reliability and validity of the externalizing Scale on the interRAI 0-3*. Poster accepted to the 81st Canadian Psychological Association Annual National Conference, Montreal, QC. (Cancelled due to COVID-19).

2. Li, C.*, **Lau, C.**, & Saklofske, D.H. (2019, September). *The role of creativity and its domains in predicting openness to experience: A correlational and regression analysis study*. Poster session presented at the 41st Ontario Association of Consultants, Counsellors, Psychometrists, and Psychotherapists Conference, Toronto, Ontario.
 - *indicates co-supervised undergraduate thesis student
3. Yosopov, L., **Lau, C.**, & Saklofske, D.H. (2019, September). *Does emotional intelligence predict emotional toughness? The mediating role of resiliency in the relationship between emotional intelligence and satisfaction with life*. Poster session presented at the 41st Ontario Association of Consultants, Counsellors, Psychometrists, and Psychotherapists Conference, Toronto, Ontario.
4. **Lau, C.**, Chiesi, F., Saklofske, D.H., Yan, G., & Li, C*. (2019, May). *How essential is the essential resilience scale? Differential item functioning for Chinese and English versions*. Poster session presented at the Association for Psychological Science, Washington, D.C.**
 - *indicates co-supervised undergraduate thesis student
 - **won RISE Convention Award Honorary Mention
5. Yosopov, L., **Lau, C.**, & Saklofske, D.H. (2019, May). *Humour and life satisfaction: The mediating role of resiliency*. Poster session presented at the Western-Waterloo-Wilfred Laurier Conference, Waterloo, Ontario.
6. **Lau, C.**, Chiesi, F., Yosopov, L., & Saklofske, D.H. (2019, March). *The combinative role of traits cheerfulness and seriousness in predicting resiliency and well-being: A moderated mediation model*. Poster session presented at the Western Student Research Forum, London, Ontario.
7. **Lau, C.**, Chiesi, F., Hofmann, J., Ruch, W., & Saklofske, D. H. (2018, August). *What makes cheerful people satisfied with life? Investigating mediating effects of self-esteem and behavioral activation*. Poster session presented at the Second International Cross-Cultural Conference Healthier Societies Fostering Healthy Organizations, Florence, Italy.
8. **Lau, C.**, Chiesi, F., Hofmann, J., Ruch, W., & Saklofske, D.H. (2018, August). *Discovering Italian sense of humour: Psychometric validation of the Italian version of the state trait cheerfulness inventory*. Poster session presented at the Second International Cross-Cultural Conference Healthier Societies Fostering Healthy Organizations, Florence, Italy.
9. Chiesi, F., Marunic, G., & **Lau, C.** (2018, August). *Psychometric properties of the Italian version of the Sense of Coherence-Revised scale (SOC-R)*. Poster session presented at the Second International Cross-Cultural Conference Healthier Societies Fostering Healthy Organizations, Florence, Italy.
10. Stewart, S.L., & **Lau, C.** (2018, May). *Psychometric validation of the Child and Youth Mental Health parenting scale*. Poster session presented at the 2018 Canadian interRAI Conference, Calgary, Canada.
11. **Lau, C.**, Stewart, S.L., Saklofske, D. H., Babcock, S.E., & Hirdes, J. (2017, November) *The interRAI Child and Youth Mental Health Assessment (ChYMH) externalizing subscale: Bayesian correlations of the measure with criterion measures of conduct and externalizing behaviours*. Poster session presented at the 5th Annual Child and Adolescent Psychiatry Research Half Day, London, ON.

12. **Lau, C.**, Feher, A., Wilson, C.A., Babcock, S.J., & Saklofske, D.H. (2017, November). *Do resilient people search for meaning differently? Moderation effects of sense of mastery and meaning in life on satisfaction with life*. Poster session presented at the Swiss Positive Psychology Association Congress, Zurich, Switzerland.
13. **Lau, C.**, Stewart, S.L., Saklofske, D. H., & Tremblay, P.F. (2017, June). *Diagnostic agreement of the interRAI Child and Youth Mental Health (ChYMH) sleep scale and sleep disorder diagnosis: A multisite study*. Poster session presented at the Canadian Psychological Association 78th Annual Conference, Toronto, ON.
14. ****Lau, C.**, Stewart, S.L., Saklofske, D. H., & Tremblay, P.F. (2017, June). *Development of the internalizing scale on the interRAI ChYMH*. Poster session presented at the Canadian Psychological Association 78th Annual Conference, Toronto, ON.
***Won runner-up for best poster award in the Clinical Psychology Section*
15. ****Lau, C.**, Ford, J., Van Lieshout, R., Saperson, K., McConnell, M., & McCabe, R. (2017, May) *Mentoring in psychiatry: Preliminary findings on the effects of curriculum-guided mentoring on mentee personal development*. Poster session presented at the 29th Annual Department of Psychiatry and Behavioural Neurosciences Research Day, McMaster University, Hamilton, ON.
***Won best poster award in the Graduate Clinical/Education Division*
16. **Lau, C.**, Saklofske, D.H., Stewart, S.L., & Tremblay, P. F. (2017, January). *Sex differences in risk factors for problematic video gaming in children and adolescents*. Poster session presented at the 2017 Society for Personality and Social Psychology Convention, San Antonio, TX.
17. Saklofske, D.H., **Lau, C.**, Stewart, S.L., & Tremblay, P. F. (2017, January). *A concurrent validity study of the interRAI ChYMH aggressive disruptive behaviour and hyperactivity-distractibility scales*. Poster session presented at the 2017 Society for Personality and Social Psychology Convention, San Antonio, TX.
18. **Lau, C.**, Stewart, S.L., & Saklofske, D.H. (2016, November). *Validation of the interRAI Child and Youth Mental Health (ChYMH) sleep scale*. Poster session presented at the 4th Annual Child and Adolescent Psychiatry Research Half Day, London, ON.
19. **Lau, C.**, Ford, J., Van Lieshout, R.J., Saperson, K., McConnell, M.M., & McCabe, R. (2016, June). *Developing mentoring competency: Does a one session training workshop have impact?*. Poster session presented at the Canadian Psychological Association 77th Annual Conference, Victoria, BC.
20. **Lau, C.**, Stewart, S.L., Tremblay, P.F., & Saklofske, D. H. (2016, June). *Investigating the discriminant-convergent validity of interRAI ChYMH externalizing scales in children diagnosed with disruptive behaviour disorders and anxiety disorders*. Poster session presented at the Canadian Psychological Association 77th Annual Conference, Victoria, BC.
21. **Lau, C.**, Ford, J., Van Lieshout, R., Saperson, K., McConnell, M.M., & McCabe, R. (2016, April). *Curriculum-guided mentoring vs. unstructured mentoring: effect on mentor competency and mentee*

personal development. Poster session presented at the 28th Annual Department of Psychiatry and Behavioural Neurosciences Research Day, McMaster University, Hamilton, ON.

22. **Lau, C.**, Stewart, S.L., Tremblay, P.F., & Saklofske, D. H. (2016, April). *Evaluating the validity of interRAI ChYMH scales in children diagnosed with externalizing disorders*. Poster session presented at the 2016 World InterRAI Conference, Toronto, ON.
23. **Lau, C.**, Ford, J., Van Lieshout, R., Saperson, K., & McCabe, R. (2015, April). *The development of a mentorship program for psychiatry residents and faculty*. Poster session presented at the 27th Annual Department of Psychiatry and Behavioural Neurosciences Research Day, McMaster University, Hamilton, ON.

JOURNAL AD-HOC REVIEWER

Personality and Individual Differences
 Journal of Happiness Studies
 Social Psychology
 BMC Health Services Research
 BMC Psychology
 Current Psychology
 Canadian Journal of Psychiatry
 International Journal of Mental Health and Addiction
 Spanish Journal of Psychology

TEACHING EXPERIENCES

- Guest Lecturer**, Western University Winter 2021
 Psychology 2080: “Introduction to Test Construction” (second year course)
 Topic: Development and validation of a scale.
- Teaching Assistant**, Western University Fall 2020
 Psychology 2043: “Exceptional Children: Developmental Disorders” (second year course)
 Topic: Developmental Disorders in Children.
- Guest Lecturer**, Western University Fall 2019
 Psychology 2080: “Introduction to Test Construction” (second year course)
 Topic: Cross-cultural measurement in psychology.
- Guest Lecturer**, Western University Fall 2018
 Psychology 2080: “Introduction to Test Construction” (second year course)
 Topic: State-Trait Model of Cheerfulness and Item Response Theory.
- Guest Lecturer**, Brescia University College Winter 2018
 Psychology 2856G: “Research Methods” (second year course)
 Topic: Expectations for Graduate School.

- Guest Lecturer**, Brescia University College Winter 2017
 Psychology 2856G: “Research Methods” (second year course)
 Topic: Research Methodology on Human Subjects.
- Teaching Assistant**, Western University Fall 2016
 Psychology 2310: “Abnormal Psychology” (second year course)
 Topics: Etiology, course, and treatment of disorders in the DSM-5.
- Teaching Assistant**, Western University Fall 2015
 Psychology 3301: “Clinical Psychology” (third year course)
 Topics: Role of clinical psychologists in school, health, forensic, hospital, and private practice settings.
- Teaching Assistant**, McMaster University Winter 2015
 Psychology 1XX3: “Foundations of Psychology, Neuroscience, and Behaviour”
 Topics: Introduction to neuroscience, visual and auditory system, psychopathology.
- Teaching Assistant**, McMaster University Fall 2014
 Psychology 1X03: “Introduction to Psychology, Neuroscience, and Behaviour”
 Topics: Introduction to cognition, behaviour, and interpersonal mechanisms in psychology.
- Teaching Assistant**, McMaster University Winter 2014
 Life Sci 2C03: “Neural Communications and Information Processing” (second year life sciences course)
 Topics: Neuroanatomy, functionality of ion channels, axon growth, synaptic plasticity.

RESEARCH SUPERVISION

Independent Study/Honours Thesis Students:

Honours Thesis Co-supervisor – C. Li (2019–2020); Project Title: Psychopathy and humor*

Independent Study Co-supervisor – C. Li (2019); Project Title: Humor and creativity**

Honours Thesis Co-supervisor – A. Rikken (2018–2019); Project Title: Psychometric validation of the Spanish version of the Resiliency Scale for Young Adults

* Won the 2020 Global Summit Undergraduate Award in Psychology for best undergraduate thesis award in over 4000 submissions

**Independent study submission won top ten percent in the Psychology category in the Global Undergraduate Award