Time Perspective in Individuals with Sluggish Cognitive Tempo

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Individuals with sluggish cognitive tempo (SCT) experience difficulties in achieving goal-directed behaviors. As time perspective (TP) helps elaborate problems in goal pursuit, this study aimed to identify the TP of individuals with SCT and compare it to individuals with attention-deficit/hyperactivity disorder (ADHD). The screening was performed using the Barkley Adult ADHD Rating Scale-IV, and participants were divided into the following groups: SCT & ADHD ($n = 20$), SCT only ($n = 46$), ADHD only ($n = 22$), and healthy controls ($n = 28$). To assess TP, participants also completed the Swedish Zimbardo Time Perspective Inventory. After controlling for depression and anxiety, the SCT only group showed higher present-fatalistic and future-negative TP compared to healthy controls. The ADHD only group showed higher present-hedonistic and future-negative TP when compared to healthy controls. These results indicate that individuals with SCT have a generally fatalistic attitude and an aversive view of the future, possibly associated with low engagement in social and academic activities. On the other hand, individuals with ADHD have a present-oriented view and an aversive view of the future, possibly related to impulsivity.

Keywords: sluggish cognitive tempo, attention-deficit/hyperactivity disorder, time perspective, present-fatalistic, present-hedonistic, future-negative

Introduction

Sluggish cognitive tempo (SCT) is a cluster of symptoms characterized by sluggishness, daydreaming, slow movement, hypoactivity, and mentally foggy (Barkley, 2012, 2013). Initially, SCT was considered to be a specifier of attention-deficit/hyperactivity disorder (ADHD); now, it has become clear that SCT should be studied as a psychiatric disorder in its own right (Garner et al., 2017). More specifically, factor analysis studies have repeatedly shown that SCT is strongly related to but distinct from ADHD inattention, internalizing symptoms of depression and anxiety, and daytime sleepiness (Garner, Mrug, Hodgens, & Patterson, 2013; Leikauf & Solanto, 2017; Smith, Eadeh, Breaux, & Langberg, 2018). In

terms of comorbidity patterns, ADHD symptoms are positively associated with externalizing symptoms, as in oppositional defiant disorder, conduct disorder, substance use disorder, while SCT symptoms are more positively correlated with internalizing symptoms including depression, anxiety, social withdrawal (Barkley, 2013, 2014; Becker, Garner, Tamm, Antonini, & Epstein, 2017; Fenollar Cortés et al., 2017; Jarrett, Rapport, Rondon, & Becker, 2017). In terms of executive functions, individuals with SCT had difficulties in self-organization/problem-solving, time-management, and emotion regulation. Individuals with ADHD had difficulties with time management and self-restraint (Barkley, 2012). In daily life, both SCT and ADHD symptoms are related to decreased psychological well-being. SCT is also negatively related to the physical quality of life, whereas ADHD is negatively related to the environmental quality of life (Combs, Canu, Broman Fulks, & Nieman, 2014). It is revealed that SCT is associated with difficulties in various functioning domains and turned out SCT to be

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somewhat different from ADHD; there is a need for specification of the problem with SCT.

Individuals with SCT have functional difficulties in the pursuit of a goal in various situations. They show executive functioning deficits in daily life, including self-management to time (e.g., procrastination) and self-organization/problem solving, which is required in setting and pursuing a goal (Barkley, 2012, 2013; Wood, Lewandowski, Lovett, & Antshel, 2017). Consequently, they do not have the ability to perform certain daily activities and do not actively participate in educational or social situations well, indicating difficulty in preparation and action for goal-pursuit (Combs et al., 2014; Flannery, Luebbe, & Becker, 2017).

Time perspective (TP) can elaborate the problems in the goal-pursuit more clearly and specifically in individuals with SCT (Lang & Carstensen, 2002; Lee & Chong, 2018). According to TP theory, TP is defined as the process whereby continual flows of personal and social experiences are assigned to temporal categories, or time frames (Zimbardo & Boyd, 1999). While growing up, individuals come to develop a habitual focus on one or more time frame through experiences and learning processes (Stolarski, Fieulaine, & van Beek, 2015). The time focus becomes consolidated, to which TP helps give order, coherence, and meaning, influencing a host of daily decisions and actions, such as decision making, goal-directed behavior, time management, and interpersonal behaviors (Shipp, Edwards, & Lambert, 2009). In this view, the ability to perceive, organize, and manage time is essential in the pursuit of goal-directed actions. Specifically, TP is required to organize sequences of actions by enabling reflection on past experiences and anticipation of future consequences. Thus, it is helpful to identify how individuals with SCT view or frame their past experiences, present situation, and future challenges to clarify problems in the pursuit of a goal.

Six dimensions of TP are suggested in the Swedish Zimbardo Time Perspective Inventory (S-ZPTI) to explain individual TPs (van Beek, Berghuis, Kerkhof, & Beekman, 2011; Zimbardo & Boyd, 1999). The "Past-Negative" dimension reflects a generally aversive view of the past, which may emerge as a result of experience of traumatic or unpleasant events. The "Past-Positive" dimension reflects a warm, sentimental attitude toward the past and correlates positively with agreeableness. The "Present-Fatalistic" dimension re-

flects a fatalistic, helpless attitude toward present and future life and relates to an absence of focused TP. The core feature of the present-fatalistic dimension is the external locus of control. The "Present-Hedonistic" dimension reflects a risk-taking and pleasure-oriented attitude toward life, with high impulsivity and little concern for future consequences of one's actions. The "Future-Negative" dimension reflects a focus on worrying and anticipating negative outcomes and is strongly associated with decreased well-being. The "Future-Positive" dimension reflects a focus on planning and achievement of future goals and is strongly correlated with motivation and discipline (Stolarski, Bitner, & Zimbardo, 2011)

Emerging evidence supports the hypothesis that individuals with SCT will show TP related to fatalistic and helpless attitudes, although TP-associated SCT symptoms have been unexamined (Becker et al., 2017; Becker et al., 2018; Bolotova & Hachaturova, 2013; Camprodon-Rosanas et al., 2017; Ferrari & Diaz-Morales, 2007; Shipp et al., 2009). More specifically, the core symptoms of SCT are associated with the main feature of present-fatalistic TP. Individuals with SCT report confusion, lethargy, and a lack of motivation; similarly, present-fatalistic TP reflects the external locus of control and a sense of helplessness (Shipp et al., 2009). Further, SCT and present-fatalistic TP show the behavioral tendency of withdrawal. Present-fatalistic TP has been negatively associated with school engagement and predicted a behavior pattern of avoidance and retreat in conflict situations (Bolotova & Hachaturova, 2013; Ferrari & Diaz-Morales, 2007). Individuals with SCT have been associated with higher behavior inhibition system and routinely linked to social withdrawal and low engagement rather than joining activities (Becker et al., 2017; Becker et al., 2018; Camprodon-Rosanas et al., 2017). Additionally, individuals with SCT report a variety of functional impairments, including social, academic, and daily life functioning. In addition, SCT has clinical value as a possible psychiatric disorder. Thus, it will be reflected in the past-negative and future-negative TPs, which are characterized by profile of clinical disorders (van Beek et al., 2011).

Studies have pointed out that individuals with ADHD also experience difficulties in pursuing goal-oriented behaviors, likely owing to their being anchored in a present-hedonistic mindset (Carelli & Wiberg, 2012; Park et al., 2019; Weissenberger et al., 2016; Wilens, 2004). Difficulties in executive control functions and re-

ward system may contribute to more present-oriented behavior (Scheres, Lee, & Sumiya, 2008; Sonuga-Barke, 2003, 2005). A study has shown that about 70% of ADHD patients have an alcoholic problem, and that a higher score in the present-hedonistic TP scale represents risk-taking behaviors, including substance use and abuse (Weissenberger et al., 2016; Wilens, 2004). Thus, individuals with ADHD are prone to having a higher present-hedonistic TP because of their impulsivity. These individuals also tend to have higher past-negative and future-negative TPs, as a psychiatric disorder, relative to healthy individuals (Carelli & Wiberg, 2012; Park et al., 2019).

The study aimed to investigate TP in individuals with SCT. The first objective was to clarify the TP profile of individuals with SCT symptoms. The second objective was to identify the differences in TP among individuals with SCT, individuals with ADHD, individuals with both SCT and ADHD, and controls. We hypothesized as follows: Individuals with SCT will show higher present-fatalistic TP compared with those who are free from attention problems and those with ADHD. Individuals with ADHD will show higher present-hedonistic TP compared with those who are free from attention problems. Additionally, consistent with previous findings, we hypothesized that individuals with both SCT and ADHD will show higher past-negative and future-negative TP compared with healthy individuals.

Methods

Participants and screening

Prior to the experiment, as an initial screening for SCT and ADHD, a total of 1,098 adults completed the Barkley Adult ADHD Rating Scale IV (BAARS-IV; Barkley, 2011). Candidate participants were recruited through advertisements in psychiatric clinics, online communities of individuals with attentional problems, and an internet bulletin board of several universities in Seoul, Korea. The candidate participants ranged from 18 to 58 years old; 10s (24.31%), 20s (70.35%), 30s (3.04%), 40s (0.83%), 50s (1.5%).

Based on previous recommendations on the inclusion criteria (Barkley, 2013), a threshold corresponding to the 95 percentiles of five or more symptoms was used to identify SCT and that of four or more symptoms to identify ADHD. This threshold was coupled

with evidence of impairment in one or more major life activities. In the experiment, all participants were interviewed with the structured clinical interview for DSM-5 (SCID-5; First, Williams, Karg, & Spitzer, 2016) either by one licensed clinical psychologist or by one of the three trained graduate students to determine eligibility to participate. Those who had history of or were diagnosed with psychiatric disorders were excluded from the analysis in SCT only group and control group. For the ADHD only group and SCT& ADHD group, those who had history of other psychiatric disorders other than ADHD were excluded from the analysis. Additionally, participants currently on medication for ADHD treatment were asked not to take medication on the day of participation for better measurement of their dysfunctions. Healthy control participants were randomly selected among those who did not show ADHD symptoms (lower level of ADHD compared with the mean value on the inattention and hyperactivity-impulsivity subscale of Barkley Adult ADHD Rating Scale) and SCT symptoms (lower level of ADHD compared with the mean value on the SCT subscale of Barkley Adult ADHD Rating Scale and Adult Concentration Inventory). They did not report any functioning impairment due to attentional problems on BAARS-IV and were not diagnosed with psychiatric disorders.

Finally, the following four groups were formed: (a) SCT&ADHD ($n = 20$; high levels of both SCT and ADHD); (b) SCT only ($n = 46$; high levels of SCT but not ADHD); (c) ADHD only ($n = 22$; high levels of ADHD but not SCT); and (d) control ($n = 28$; lower level of SCT and ADHD compared with the mean value).

Questionnaires and measurement

Barkley Adult ADHD Rating Scale IV (BAARS–IV)
BAARS-IV was used to assess symptoms of SCT and ADHD and then divide the groups. BAARS-IV was developed to assess the levels of ADHD and SCT (Barkley, 2011) and has been validated (Becker, Langberg, Luebbe, Dvorsky, & Flannery, 2014). Since Korean version of BAARS-IV has not been validated, BAARS-IV was translated into Korean with consultation with a clinical psychologist expert in attention problems; the scale was backtranslated into English with the aid of a bilingual interpreter. The accuracy of the translation was evaluated by comparing the original and back translated versions; the content of several questions was revised

accordingly. BAARS-IV contains 18 items that are consistent with DSM-5 criteria for ADHD and 9 items that target the symptoms of SCT (e.g., prone to daydreaming when I should be concentrating on something or working; easily confused; slow moving). Using a four-point Likert scale (1 = not at all; 2 = sometimes; 3 = often; 4 = very often), the participants responded to each item with reference to how often each statement best described their behavior in the past six months. The higher the BAARS-IV score, the more each attentional symptom they experience. In the present study, Cronbach's α values were .88, .85, and .90 for ADHD inattention, ADHD hyperactivity-impulsivity, and SCT, respectively.

Adult Concentration Inventory (ACI)

ACI was used to confirm the differences in the level of SCT in groups. Originally developed for a new adult self-report measure of SCT (Becker, Burns, & Willcutt, 2015), ACI was used in this study after the same translation procedure for BAARS-IV. Among 16 items, 10 items of ACI were identified as optimal for the assessment of SCT symptoms in a validation study of 3,172 undergraduate students (Becker et al., 2018). Thus, the present study analyzed 10 items of ACI. These items were rated on a four-point Likert scale (0 = not at all; 1 = sometimes; 2 = often; 3 = very often) with reference to the past six months. The higher the ACI score, the more SCT symptoms they experience. Cronbach's α of 10-item ACI scale was .89 in the validation study (Becker et al., 2018) and Cronbach's α was .88 in the present study.

Korean version of Swedish Zimbardo Time Perspective inventory (S–ZTPI)

S-ZTPI was used to measure and compare the six dimensions of TP in participants. S-ZTPI was developed as an extended version of the original Zimbardo time perspective inventory (Zimbardo & Boyd, 1999) specifying the future dimension into future-negative and future-positive dimensions; it has been validated in Korean (Carelli, Wiberg, & Wiberg, 2011; Park, Kim, & Lee, 2017). S-ZTPI includes 64 items related to the time perspective and temporal orientation of individuals and consists of the past-negative, past-positive, present-fatalistic, present-hedonistic, future-negative, and future-positive dimensions. These items were rated on a five-point Likert scale (1 = very uncharacteristic, 5 = very characteristic). The

higher each TP subscale score, the more the participant is oriented to the TP subscale. Internal consistency of Korean version of S-ZPTI was .73 for all items, .84 for past-negative, .71 for past-positive, .74 for present-fatalistic, .74 for present-hedonistic, .77 for future-oriented. Cronbach's α was .89 for past-negative, .79 for past-positive, .84 for present-fatalistic, .81 for present-hedonistic, .74 for future-negative, and .74 for future-positive in the present study.

Beck Depression Inventory—Second Edition (BDI—II)

BDI-II was used to compare and control the level of depression among participants. BDI-II was developed to assess the levels of depression (Beck, Steer, Ball, & Ranieri, 1996), and has been validated in Korean (Lim, Lee, Hwang, Hong, & Kim, 2014a). The BDI-II includes 21 items associated with physical and cognitive symptoms of depression rated on a four-point Likert scale (0 = not at all; 1 = mildly; 2 = moderately; 3 = severely) with reference to the past one week. The higher the BDI-II score, the higher level of depression. Cronbach's α was .89 in the validation study and .94 in the present study.

Beck Anxiety Inventory (BAI)

BAI was used to compare and control the level of anxiety among participants. BAI was developed to assess the levels of anxiety (Beck, Epstein, Brown, & Steer, 1988) and has been validated in Korean (Lim, Lee, Hwang, Hong, & Kim, 2014b). It includes 21 items related to physical and cognitive symptoms of anxiety rated on a four-point Likert scale (0 = not at all; 1 = mild; 2 = moderate; 3 = severe), with reference to the preceding one week. The higher the BAI score, the higher level of anxiety. Cronbach's α was .91 in the validation study and .95 in the present study.

The Wechsler Adult Intelligence Scale—Fourth Edition (WAIS—IV)

The WAIS-IV was developed as a measure of general intellectual functioning (Wechsler, 2008). In the present study, brief version of WAIS-IV was used to see if there is a difference in intelligence among groups and control the difference. The Arithmetic and Information subtests of the WAIS-IV were used, as these subtests were reported to have the strongest correlation with the full scale intelligence quotient (IQ) in the Korean WAIS-IV as a screening measure of intelligence (Choe et al., 2014; Hwang, Kim, Park, Choi,

& Hong, 2012). The estimated full scale IQ was calculated using regression equations [54.762+(2.330×AR)+(2.151×IN)] suggested (Choe et al., 2014). The higher the brief version of WAIS-IV, the higher their intelligence.

Procedure

The participants were invited to the laboratory and given brief instructions on the procedure and their rights as research participants. Then, they signed an informed consent form approved by the institutional review board of Chung-Ang University. All participants were interviewed with the SCID-5 to determine eligibility for the experiment for the experiment. The participant with no history of psychiatric disorders were interviewed with the brief version of WAIS-IV and completed the self-report questionnaires (ACI, BDI-II, and BAI). The participants were debriefed on the aim of the study and each procedure and received monetary rewards (about 5 US dollars). If participants wanted to get the result of the research, brief report on individual result and general result of the experiment were provided. The entire experimental session took approximately 30 minutes. This study was approved by approved by the institutional review board of Chung-Ang University

(No. 1041078-201908-HR-243-01).

Data analysis

For data analysis, a chi-squared test and a one-way analysis of variance (ANOVA) were performed to analyze differences in the characteristics of all groups. ANOVA was performed six times to compare the six dimensions of TP between groups. Given the differences in the level of depression and anxiety among groups, one-way covariate analysis of variance (ANCOVA) was performed to investigate the differences in the six dimensions among groups after controlling for depression and anxiety. When significant group differences were observed, pairwise group contrasts using Bonferroni post-hoc tests were performed. All statistical data were analyzed using SPSS 23.0 for Windows.

Results

Demographic and clinical characteristics

Table 1 shows the demographic and clinical characteristics of the participants. There were no significant differences in the mean age, $F(3, 112) = 2.10$, $n.s$, proportion of sex, $\chi^2(3) = 3.84$, $n.s$, and es-

Table 1. *Demographic and clinical characteristic for each group*

Measure	Group				F/χ^2	Post-hoc
	1 Control ($n=28$)	2 SCT only ($n=46$)	3 ADHD only ($n=22$)	4 SCT&ADHD ($n=20$)		
Age (yr)	21.96 (2.62)	21.37 (2.06)	22.82 (2.42)	22.45 (2.89)	2.31	
Sex (male/female)	18/10	19/27	11/11	11/9	3.84	
Estimated IQ	106.97 (9.35)	104.34 (11.45)	106.77 (9.89)	107.38 (11.65)	0.58	
BAARS-IV						
ADHD IN	10.71 (3.34)	18.17 (2.07)	21.05 (3.62)	26.50 (3.41)	117.71*	4>3>2>1
ADHD H-I	10.25 (2.73)	15.00 (2.85)	18.91 (4.28)	23.20 (3.92)	65.96*	4>3>2>1
SCT	10.71 (4.35)	24.87 (2.42)	18.91 (2.99)	27.55 (3.30)	146.92*	4>2>3>1
ACI	5.86 (5.31)	17.74 (3.69)	12.55 (3.95)	20.75 (4.40)	62.03*	4,2>3>1
BDI-II	5.33 (8.68)	16.80 (7.68)	13.67 (9.85)	28.13 (15.84)	16.00*	4>3,2>1
BAI	3.04 (5.59)	14.68 (9.39)	12.05 (12.64)	23.26 (19.09)	10.34*	4,2>1 4>3

Note. Mean (standard deviation).
SCT = Sluggish Cognitive Tempo; ADHD = Attention-Deficit/Hyperactivity Disorder; Estimated IQ = Intelligence Quotient estimated by Wechsler Adult Intelligence Scale; BAARS-IV = Barkley Adult Attention-deficit/ Hyperactivity Disorder Rating Scale IV; IN = Inattentive; H-I = Hyperactive and impulsive; SCT = Sluggish cognitive tempo; ACI = Adult Concentration Inventory; BDI-II = Beck Depression Inventory-II; BAI = Beck Anxiety Inventory.
Test Statistics (F) = results of the omnibus F-test. Where the F test was significant, the results of pairwise group comparison using Bonferroni are shown as well.
*$p < .05$.

timated IQ, $F(3, 112) = 0.58$, *n.s*, among the groups.

According to the selection criteria, there were significant effects for ADHD inattention, $F(3, 112) = 117.71$, $p < .001$, $\eta_p^2 = .76$, ADHD hyperactivity-impulsivity, $F(3, 112) = 65.96$, $p < .001$, $\eta_p^2 = .64$, SCT in BAARS-IV, $F(3, 112) = 146.91$, $p < .001$, $\eta^2 = .80$, and ACI, $F(3, 112) = 62.03$, $p < .05$, $\eta_p^2 = .65$. As expected from the inclusion criteria, the two SCT groups (SCT& ADHD, SCT only) had significantly higher SCT symptoms compared with the other two groups, although the ADHD only group also had significantly higher SCT symptoms on both measures compared with the control group. Additionally, the two ADHD groups (SCT&ADHD, ADHD only) had significantly higher ADHD inattention and hyperactivity-impulsivity symptoms relative to the two other groups, although the SCT only group also had significantly higher ADHD symptoms on both dimensions compared with the control group.

In the measure of clinical features, there were significant effects for BDI-II, $F(3, 98) = 16.00$, $p < .05$, $\eta_p^2 = .33$ and BAI, $F(3, 98) = 10.34$, $p < .001$, $\eta_p^2 = .16$. In the depression scale, pairwise comparisons among the groups indicated that all three of the disorder groups were rated as significantly more depressive compared with the control group, and the SCT&ADHD group showed the highest degree of self-reported depression. In the anxiety scale, the SCT&ADHD group and the SCT only group had a significantly higher degree of anxiety compared with other groups, and the SCT&ADHD group showed a higher level of anxiety than the ADHD only group. Thus, each attentional problem showed an ad-

ditive value on depression, and SCT symptom had a value on anxiety.

Group comparison of TP

Table 2 shows the group differences for the six subscales of S-ZP-TI. There were significant group differences in past-negative, $F(3, 111) = 10.95$, $p < .05$, $\eta_p^2 = .23$, present-fatalistic, $F(3, 111) = 12.45$, $p < .05$, $\eta_p^2 = .25$, present-hedonistic, $F(3, 111) = 6.50$, $p < .05$, $\eta_p^2 = .15$, and future-negative subscales, $F(3, 111) = 17.99$, $p < .05$, $\eta_p^2 = .76$. There was no significant group effect for groups for past-positive, $F(3, 111) = 1.57$, *n.s*, and future-positive, $F(3, 111) = 0.89$, *n.s*.

Group comparison of TP after controlling for depression and anxiety

After controlling for depression and anxiety levels, there were significant group effects in the present-fatalistic, present-hedonistic, and future-negative subscales. In addition to the past-positive and future-positive TPs, there was no significant difference among groups in past-negative TP, $F(3, 94) = 2.19$, *n.s*.

Present−fatalistic TP

There was a significant main effect for groups in the present-fatalistic scale, with medium effect size, $F(3, 94) = 3.89$, $p < .05$, $\eta_p^2 = .11$. Subsequent post-hoc test revealed that the SCT only group showed significantly higher mean ratings compared with the control group, $p < .05$, indicating that individuals with SCT had more present-fa-

Table 2. *Comparison of differences in the mean ratings of the six S-ZTPI subfactors for groups*

S-ZPTI	1 Control (N=28)	2 SCT only (N=46)	3 ADHD only (N=22)	4 SCT&ADHD (N=20)	F	Post-hoc
PN	1.98 (.88)	2.92 (.66)	2.63 (.88)	3.17 (.88)	10.95*	2,3,4 > 1
PP	3.18 (.63)	3.18 (.75)	2.88 (.82)	2.82 (.87)	1.57	
PF	1.78 (.70)	2.70 (.73)	2.18 (.70)	2.78 (.67)	12.45*	2,4 > 1,3
PH	2.52 (.58)	2.91 (.47)	3.22 (.67)	3.06 (.72)	6.50*	2,3,4 > 1
FN	2.23 (.62)	3.16 (.53)	3.01 (.56)	3.26 (.66)	17.99*	2,3,4 > 1
FP	3.22 (.68)	3.01 (.50)	3.15 (.57)	3.01 (.87)	0.89	

Note. Mean (standard deviation).
S-ZPTI = Swedish version of the Zimbardo Time Perspective Inventory; PN = past-negative subscale; PP = past-positive subscale, PF = present-fatalistic subscale, PH = present-hedonistic subscale, FN = future-negative subscale, FP = future-positive subscale.
Test Statistics (*F*) = results of the omnibus *F*-test. Where the *F* test was significant, the results of pairwise group comparison using Bonferroni are shown as well; η_p^2 = Effect size (partial η^2).
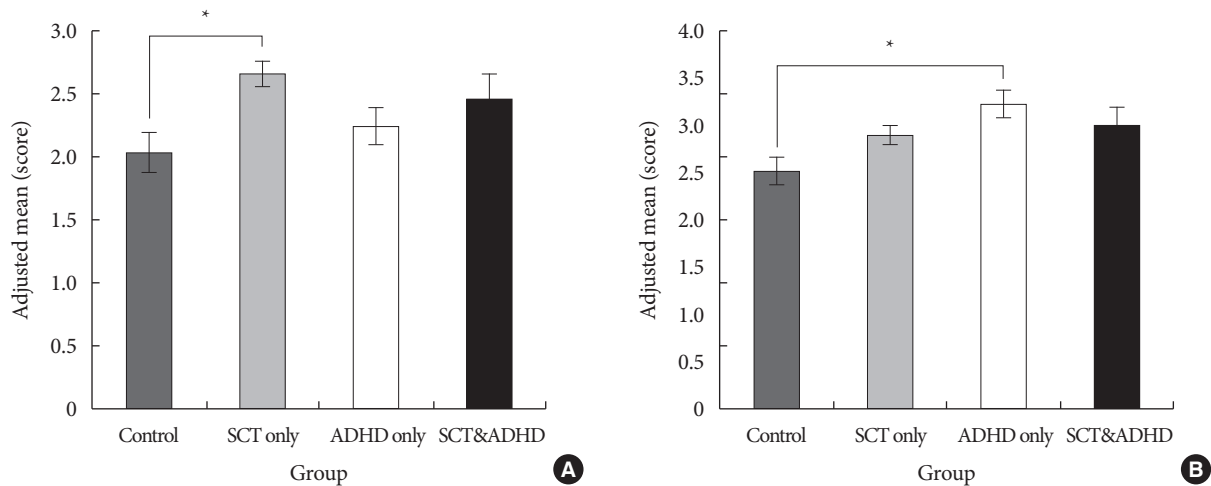*$p < .05$.

Figure 1. *Comparison of time perspective among groups after controlling for depression and anxiety symptoms. (A) represents the present-fatalistic time perspective. (B) represents the present-hedonic time perspective.*
Note. Error bars represent standard error of the mean.
*p < .05.

talistic TP compared with healthy individuals even after controlling for the level of depression and anxiety (Figure 1A).

Present–hedonistic TP

There was a significant main effect for groups in the present-hedonistic scale, with medium effect size, $F(3, 94) = 4.39$, $p < .05$, $\eta_p^2 = .12$. Subsequent post-hoc test revealed that the ADHD only group showed significantly higher mean ratings compared with the control group, $p < .05$. Thus, individuals with ADHD had more present-hedonistic TP compared with healthy individuals even after controlling for the level of depression and anxiety (Figure 1B).

Future–negative TP

There was a significant main effect for groups in the future-negative scale, with medium effect size, $F(3, 94) = 6.33$, $p < .05$, $\eta_p^2 = .17$. Subsequent post-hoc test revealed that the SCT only group, $p < .05$, and ADHD only group, $p < .05$, showed significantly higher mean ratings compared with the control group. In addition, the SCT& ADHD group showed significantly higher mean ratings marginally compared with the control group, $p = .08$. These results indicated that individuals with SCT or ADHD seem to have more future-negative TP compared with healthy individuals, at least to a marginal trend.

Discussion

This study was to examine the TP in individuals with SCT in comparison to those with ADHD and healthy individuals. The present study found that individuals with SCT showed higher present-fatalistic and future-negative TP compared with healthy individuals. Meanwhile, individuals with ADHD showed higher present-hedonistic and future-negative TP compared with the controls.

The main finding was that individuals with only SCT symptoms tended to have higher fatalistic and helpless attitude as well as negative attitude toward the future relative to healthy individuals. It is consistent with the hypothesis and can be considered with previous studies (Becker, 2013; Combs et al., 2014; De Bilde, Vansteenkiste, & Lens, 2011; Flannery et al., 2017; Lee & Chong, 2018; Stolarski & Matthews, 2016). The future-negative dimension has shown the strongest correlation with decreased well-being among the TPs (Stolarski & Matthews, 2016). Goal-focused activities and social activities with family and friends have a mediating effect in the relations of balanced TP and subjective well-being for early-aged adults (Lee & Chong, 2018). Thus, the importance of goal-directed engagement and social relationship in the well-being of young adults is highlighted. Present fatalism is associated with low self-efficacy and school engagement, and positively predicts procrastination, suggesting that fatalistic TP have influence on the

low quality of life (De Bilde et al., 2011). SCT has emerged as a strong indicator of a low quality of life because it affects one's energy level, capacity for work, and ability to perform daily activities (Combs et al., 2014). In addition, students with SCT have reported daily life executive function deficits in educational and community activities, as well as social situations with strangers and friends (Flannery et al., 2017). Taken together, sluggish/sleepy and daydreamy behaviors of SCT can be related to present-fatalistic functional impairments; the present fatalism may influence well-being in young adults (Becker, 2013).

The results of the present study support the idea that individuals with SCT need to be treated differentially from those with ADHD in clinical settings. Although there is no known intervention directly targeting SCT symptoms, it seems that intervention targeting behavioral activation or fatalistic thought may help relieve symptoms in individuals with SCT (Combs et al., 2014). Behavior management strategies were effective in alleviating symptoms and improve academic difficulties in individuals with high SCT in the group of ADHD inattention (Pfiffner et al., 2007). In fact, cognitive behavioral therapy (Abikoff, 1985) or social skill learning (Antshel & Remer, 2003), which have been shown to be ineffective for those with ADHD, may be effective in alleviating symptoms of SCT (Lee, 2014). Moreover, since treatments for internalizing symptoms have been effective in both CBT and social skill learning, it appears that these interventions could also help to alleviate the symptoms of SCT and related internalizing problems. Additionally, the result indicates that negative effects from present-fatalism could be balanced by past-positive memories, healthy or selected present-hedonism, and future-positive TP. Therefore, considering interventions focusing on changing the way of thinking would be worthwhile (Sword, Sword, & Brunskill, 2015; Zimbardo, Sword, & Sword, 2012).

Another finding was that individuals with only ADHD symptoms showed a tendency to seek immediate pleasure and have a generally negative attitude toward the future compared with healthy individuals. This finding is consistent with the research hypothesis and with previous works in which ADHD patients show higher present-hedonistic tendencies and generally negative view of life (Carelli & Wiberg, 2012; Park et al., 2019; Weissenberger et al., 2016). ADHD-related impairments in executive control

and inappropriate functioning of the reward system both relate to present-hedonistic systematic bias in TP (Carelli & Wiberg, 2012). A recent study also indicated that ADHD patients with more severe symptoms have a more negative view toward the future, and that more executive function deficits were related to a difficulty in viewing the future in a constructive way (Park et al., 2019). Taken together, individuals with ADHD predict their future more negatively owing to more failure related to impulsivity in school and social relationships while growing up.

Individuals with SCT or ADHD showed significantly (at least marginally) higher future-negative TP compared with the healthy individuals, but did not in past-negative TP after controlling for depression and anxiety. Past-negative and future-negative TP seem to be indicative of psychiatric problems, but are themselves distinct in terms of psychological distress (van Beek et al., 2011). Past-negative TP is powerfully loaded with negative emotionality, including depression and anxiety, and also related to rumination (Rönnlund, Åström, & Carelli, 2017). Thus, the results indicate that the negative view toward the past might be owing to the negative emotionality developed through failure in controlling motivation or impulsivity.

The current findings should be considered with respect to the following limitations. First, although the result of the present study showed that individuals with SCT and those with ADHD have different patterns of TP orientation compared to healthy controls, the results did not show any significant statistical difference in present-hedonic and present-fatalistic TP between those with SCT and those with ADHD. One possibility for this finding is that there could be a mediator or a moderator between the relationship between TP and attentional problems yet to be identified. TP is not affected by attentional problems alone, but also by other factors such as stress, motivation, and personality (Papastamatelou, Unger, Giotakos, & Athanasiadou, 2015). Since the present study focused on the direct impact of different attentional problems on the TP, further research studying other factors would be meaningful to fill the gap between them. In addition, the present study might not have provided sufficient evidence to support the hypothesis that the differences in TP will have different impact on symptoms and problems those with SCT and ADHD experience. To do this, more in-depth research remain to be conducted to in-

vestigate more direct impact of difference in TP profile of those with SCT and with ADHD in terms of social, academical, and daily life functioning domain. Also, due to the practical limitations including the small sample size, the relationship between TP and ADHD subtypes could not be identified. In the present study, 15 of the 20 participants in the SCT&ADHD group showed ADHD combined presentation; the other 5 participants were predominantly inattentive presentation. In the ADHD only group, 12 of the 22 participants showed ADHD predominantly inattentive presentation, 7 showed ADHD predominantly hyperactive/impulsive presentation, and 3 were characterized by ADHD combined presentation. As most of the SCT&ADHD group were ADHD combined types and the group showed higher ADHD and SCT symptoms and more clinical features (depression and anxiety) compared with the other groups, the TP of the group is possibly indicative of their weighted distress as well as attention problem.

Despite these limitations, the current study has several important implications. The present study identified and specified the TP profile of individuals with SCT. The results offer a possible explanation for how a variety of difficulties in individuals with SCT from time management problem to low engagement behaviors in various situations could be derived from a present-fatalistic TP. Further, this study adds to the validity of SCT as a clinical symptom in its own right and a distinct disorder from ADHD from TP in individuals with SCT. Individuals with SCT should be treated differently from those with ADHD in a clinical setting. Further, this study adds validity to SCT as a clinical symptom on its own and a distinct disorder from ADHD. In clinical setting, it could be more beneficial for those with SCT to be treated differently from those with ADHD in order to maximize effectiveness of treatments.

Conflict of interest

All authors declare that they have no conflicts of interest.

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