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#### A Concordance Hypothesis

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# Effects of Dispositional and Instructional Time Perspective on Academic Performance and Motivations Among Primary School Students: A Concordance Hypothesis

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**Background:** Dispositional future time perspective (FTP) has been acknowledged for its benefits on academic outcomes. Lacking in the literature are 1) understanding of FTP in children, 2) experimental studies, and 3) evidence for time perspective concordance (i.e., matching between dispositional and instructional FTP yield favorable outcomes).

**Aims:** Therefore, this study examined whether dispositional FTP, instructional FTP, and their interaction were associated with academic outcomes including reading performance and academic motivations among primary school students.

**Sample:** The participants were grade-2 or grade-3 Hong Kong students ( $N = 92$ ; Age:  $M = 8.05$ ,  $SD = 0.72$ ; 45% girls).

**Methods:** The participants rated their dispositional FTP and were randomly assigned to draw a picture of their future or present self with the assumption that they study hard. The students then completed a reading task and rated their intrinsic motivation, extrinsic motivation, and amotivation.

**Results:** Better reading scores were found in future-oriented students who drew a future self and those less future-oriented who drew a present self. No concordance effects were found on motivations. Nevertheless, the future-drawing task led to a greater extrinsic motivation than the present-drawing task.

**Conclusions:** Some children may have developed FTP in their middle childhood. Academic motivations may be more malleable at a younger age. When facing incongruent instructional context, more cognitive resources may be drained to resolve the dissonance and, thus, compromise the cognitive performance. Rather than a predominant focus on future achievements, a balanced emphasis on present and future or a temporally tailored instructional context for individuals may be considered in primary education.

**Keywords:** future time perspective (FTP), academic motivation, person-environment (P-E) fit, instructional environment, academic performance

## INTRODUCTION

Human thinking and behaviors are influenced by temporal contexts (Suddendorf et al., 2009). Learning, particularly, possesses a strong future focus (Husman et al., 2015). Time perspective, as the orientation and understanding of individuals psychological past, present and future (Kauffman and Husman, 2004), influences judgment, decision, and actions (Zimbardo and Boyd, 1999). Future time perspective (FTP) has been acknowledged in education for its positive effect on academic outcomes (e.g. Shell and Husman, 2001; Phalet, Andriessen, and Lens, 2004; Andre et al., 2018; Alm et al., 2019).

The benefits of FTP were less evident in children. Children's abilities to understand future may depend on their varied cognitive development (Zajenkowski et al., 2015). Moreover, the learning environment may not be congruent with their time perspective. That is, students who speak "a present-oriented dialect" may be in an instructional context that requires them to recognize the meaning of future-oriented language (Zimbardo and Boyd, 1999). Using an experiment, this study examined whether dispositional FTP, instructional FTP, and their interaction were associated with academic outcomes among primary school students.

### Time Perspective, Academic Performance, and Academic Motivation

FTP is defined, generally, as the extent and the way of anticipation and integration of the psychological present life-space to the future (Husman and Lens, 1999; Janeiro et al., 2017; Simons et al., 2004). People with strong FTP tend to consider the future consequences of the present activities.

#### Academic Performance

FTP facilitates the development of abilities such as planning, persistence in goal setting, and the delay of gratification (Bembenutty and Karabenick, 2004). It promotes learning, academic achievement, and educational attainment (de Volder and Lens, 1982; Kauffman and Husman, 2004; Mello and Worrell, 2006). Simons et al. (2004) found that students who rated the course as beneficial to their future work (future-oriented) had better performance in examinations than those who thought the course to be an instantaneous training (present-oriented). In addition, FTP was positively related to grade point average and time spent on homework among college students (Shell and Husman, 2001).

#### Academic Motivation

FTP is associated with intrinsic and extrinsic academic motivations (e.g. Husman and Lens, 1999; Simons et al., 2004). Extrinsically motivated students perceive the participation of academic activities as a mean for the sake of other rewards (Husman and Lens, 1999). FTP implies the understanding of the instrumental value of present behavior (Bembenutty and Karabenick, 2004; Peetsma, and van der Veen, 2011). This instrumental value often becomes an

external source of motivation such as a step to the future goals. Empirically, FTP was positively associated with extrinsic motivation in high school and college students (De Bilde et al., 2011; Wininger and DeSena, 2012; Avci, 2013).

Intrinsically motivated students learn or perform in school to pursue personal interests (Woolfolk et al., 2015). The learning behavior is a goal itself, and doing it is rewarding (Husman and Lens, 1999). For individuals with high FTP, the future goal is internalized. They integrate the future goal into their own interest, value the present behaviors as part of the future goal (Lasane and Jones, 1999), and, eventually, become intrinsically motivated. Empirical findings in high school and college students supported the relationship between FTP and intrinsic motivation (Avci, 2013; De Bilde et al., 2011; Wininger and DeSena, 2012).

Amotivated students do not perceive contingencies between their behaviors and its outcomes (Vallerand et al., 1992). They feel incompetent and expect the situation to be uncontrollable. They could not anticipate the impact of going to school and eventually avoid any academic activities. College students with stronger FTP tended to possess less academic amotivation (Wininger and DeSena, 2012). Overall, the evidence for the relationships between FTP and academic motivation was predominately correlational and limited to high school or college populations.

### Time Perspectives in Children

Understanding the temporal linkage is not easy for children as they value and live in a sense of the present feelings (Montague-Smith, 2014). Some considered children are less cognitively capable of understanding the concept of "future", and, hence, it is unnecessary to relate FTP with children development (Mello and Worrell, 2015). In contrast, Bembenutty and Karabenick (2004) argued that FTP in children was associated with delay gratification, in which students with shorter FTP perceived the time interval longer than those with longer FTP and are less willing to delay gratification.

### The Role of the Instructional Context

Despite the dispositional nature of time perspectives, their effects on individuals can be influenced by the environment (Zimbardo and Boyd, 1999). In educational settings, the instructional context (e.g., learning objectives, learning activities, assessment tasks) is the most relevant environmental factor that influences academic outcomes. Environmental cues may have a heavier weight among children as their FTP are still in development (Shipley, 2014). If an environment provides an obvious cue for them to link the present behavior, children with stronger FTP may be able to anticipate the consequences of the present-time behaviors in learning and persist in it.

### Person-Environment Fit Theories

Walsh and Holland (1992) proposed that personality and environment congruence is associated with higher levels of educational stability, satisfaction, and achievement. Eccles et al. (1993) put the paradigm into a developmental perspective, in which children learn the best when the environment provides sufficient challenges that match with the children's current stage of maturity. Consistent with the person-environment fit paradigm, negative motivations were resulted

when individuals feel that the environment did not fit their needs (Murayama and Elliot, 2009). On the other hand, the individuals were more likely to develop a certain intention to learn if the environment matched the disposition of the individuals (Feldman et al., 2001).

The person-environment model may be extended to time perspectives. In health psychology, individuals' time perspective could moderate the effects of temporally framed messages on behavioral intentions of adequate sleep (Guan and So, 2020), health screening (Orbell and Hagger, 2006) and sunscreen use (Orbell and Kyriakaki, 2008), and the cognitive responses on exercise (Dimmock et al., 2013). In the education domain, Zimbardo and Boyd (1999) suggested that high dropout rates among students of low socioeconomic status at all levels of schooling were likely to be a result of "time perspective discordance" that the environment did not fit with their time perspectives. Children from families where present-time perspective predominate would be less ready to think in terms of causalities, probabilities, and if-then sequences than their peers. Therefore, they are not prepared to learn under the future-oriented instruction. To our knowledge, this theory of time perspective concordance (or discordance) has not been tested empirically in education settings.

## The Present Study

This study filled a few research gaps including the lack of 1) studies on time perspectives in children, 2) experimental studies on FTP-motivation relationships, and 3) evidence for time perspective concordance. Accordingly, there were three hypotheses. First, stronger dispositional FTP would be associated with better academic outcomes (i.e., better academic performance, stronger intrinsic and extrinsic motivation, and weaker amotivation) in primary school students. Second, a future-oriented instructional context would lead to better academic outcomes. Third, the concordance between dispositional and instructional FTP would lead to better academic outcomes. That is, students with strong FTP in future-oriented instructional context and students with weak FTP in present-oriented instructional context would show more favorable academic outcomes.

## MATERIALS AND METHODS

### Participants

The participants were students within classrooms, with randomization taken place at the individual level within classes. Assuming the effect size at 0.5, power at 0.80, alpha at 0.05, effect size variability across classes at 0.01, level-1 variance explained by covariates at 20%, variance explained by classes at 20%, and class size at 15, the required number of classes was 8 (Raudenbush et al., 2011). The effect size was estimated based on past studies with FTP manipulation (Allemand, 2008; Li, 2019). The estimate reflected a 50% valid response rate from a class size of 30.

The students were in grade 2 or 3 with Chinese as their first language recruited in a public primary school in Hong Kong. Among the 111 students recruited in eight classes, 19 were

excluded because they failed a quality checking item after the experimental manipulation. Therefore, the analyzed sample included 92 students (Age:  $M = 8.05$ ,  $SD = 0.72$ ; 45% being girls).

### Instruments

Adapted from the Future Time Perspective Scale (Husman and Shell, 2008), the Chinese-Version Future Time Perspective Scale (CFTPS; Lin et al., 2015) was used to measure dispositional FTP. The participants rated 27 items such as "half a year seems like a long time to me" and "it is more important to save for the future than to buy what one wants today" on a five-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). A composite score was used with higher scores indicating stronger FTP.

Academic achievement was measured by a reading task using eight questions related to a Chinese passage of about 500 characters. The passage and the questions were retrieved from The Hong Kong Education Bureau Territory-wide System Assessment (2010) for measuring the learning ability of students in grade 3. An older version was chosen to avoid any practice effect. One point was given to each correct answer.

The participants responded to the 28-item Academic Motivation Scale (Vallerand et al., 1992), which measure intrinsic motivation (e.g., "Because I experience pleasure and satisfaction while learning new things"), extrinsic motivation (e.g., "In order to have a better salary later on") and amotivation (e.g., "I can't see why I go to school and, frankly, I couldn't care less") on a seven-point Likert scale (1 = *does not correspond at all*; 7 = *correspond correctly*). The scale was translated to Chinese and backward translated by a psychology student proficient in both languages to check for consistency. The items within each factor were averaged, with higher scores indicating stronger respective factors.

The information on gender (0 = *boys*; 1 = *girls*), age (7–10), and reading frequency (1 = *not at all*; 5 = *always*) were used as covariates.

### Manipulation

The students in the future group were asked to "draw a *future you* in the picture frame below assuming you study hard". The students in the present group were asked to draw a *present you* with the same instruction. The confounding effects of age or language ability on this drawing task should be minimal. The context was studying for its relevance to academic outcomes. The task allowed students to think and visualize themselves at different time points in their lives and was able to hold their attention for about 15 min.

### Quality Check

A quality checking item was used to indicate whether the students were able to follow the experimental instructions. The students were asked to circle in the statement "the picture describes your present/future feelings".

### Manipulation Check

The four items with the highest factor loadings from CFTPS (Lin et al., 2015) were used for manipulation check. The participants rated these items on a five-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*).

## Procedures

The principal and the parents of the participants provided informed consents. The students participated voluntarily. All measures were in Chinese and administered to the participants in visual art classes. The study was conducted under the supervision of both the teacher-in-charge and the experimenter (one of the authors). The participants were randomly assigned to the two conditions within each class.

The details of the study were explained to the participants by the experimenter. The participants were instructed not to chat with others or look at others drawings. Each participant was given Booklet A (with two versions: *future* versus *present*), the reading booklet, and Booklet B. A booklet was collected before distributing the next. Booklet A, which included the CFTPS and the drawing task (*future* or *present self*), was distributed randomly. The teacher read out the items of the CFTPS one-by-one to ensure better attention and understanding among the participants. The participants then drew a picture for another 15 min. After the drawing, the participants completed the quality check and the manipulation check items.

The participants were then given the reading booklet. They were given 10 min to read and memorize the details of the passage.

Booklet B, which included the eight questions related to the passage, the Academic Motivation Scale, and the demographic questions, was administrated at last. The participants completed the reading task within 5 min. After that, the items on Academic Motivation Scale and demographics were read out one-by-one by the experimenter. The study protocol was approved by the Human Subjects Ethics Committee of the first author's university.

## Analytic Plan

To examine the impact of case exclusion and the randomization quality, *t*-tests and  $\chi^2$  tests of independence were conducted to examine, respectively, 1) the differences between those included and excluded from the analyses and 2) the differences in the baseline characteristics between those in the future and present conditions. The sample characteristics were summarized. The effect of the manipulation was examined by comparing the level of FTP after the manipulation between the conditions using a *t*-test.

The hypotheses were tested using multilevel models. One set of the multilevel models was conducted for each academic outcome. In each set, Model one was the baseline model with no predictors to show the amount of variance at the class level. Model two included only the covariates. Dispositional FTP, the code for experimental condition (0 = *present*; 1 = *future*), and their interaction term were added in Models 3, 4, and 5, respectively. Dispositional FTP was standardized to reduce multicollinearity. The fixed effects were estimated in the multilevel models using restricted maximum likelihood with the degrees of freedom adjusted for small samples (Kenward and Roger, 1997). As the interest was in total outcome variance explained, only total  $R^2$  values, rather than level-specific  $R^2$  values, were computed (Rights and Sterba, 2020).

## RESULTS

The analyzed cases were compared with the excluded cases to examine whether the exclusion might introduce biases. The

excluded ( $M = 7.47$ ,  $SD = 0.61$ ) were younger than the analyzed participants ( $M = 8.05$ ,  $SD = 0.72$ ),  $t(109) = 3.29$ ,  $p = 0.001$ . In addition, the excluded cases were more likely to be assigned to the present condition (84%),  $\chi^2(1) = 10.45$ ,  $p = 0.001$ . To examine the randomization quality, the baseline differences between the participants in the two conditions were tested. Female students were more likely to be assigned to the present condition (60%) than the future condition (33%),  $\chi^2(1) = 6.82$ ,  $p = 0.009$ . The results of manipulation check showed that the participants assigned to the future condition ( $M = 3.65$ ,  $SD = 0.93$ ) reported stronger FTP than those in the present condition ( $M = 3.17$ ,  $SD = 1.05$ ), after the manipulation,  $t(90) = 2.33$ ,  $p = 0.02$ . Therefore, the manipulation was successful.

The descriptive statistics by conditions are summarized in **Table 1**. As revealed in the results of the multilevel models (Model 1), a substantial amount of variance was at the class level for reading scores (29%) and amotivation (12%), but not for intrinsic (0%) or extrinsic motivation (0%). Dispositional FTP and drawing condition were not predictive of reading score, but their interaction was significant,  $B = 0.84$ ,  $p = 0.02$ . The regression coefficients are presented in **Table 2**. Marginal means were computed to illustrate the effects of the drawings on reading scores at z-scores 1.5 and -1.5 of dispositional FTP (**Supplementary Figure S1** in the online supplementary material). The concordance between dispositional and instructional FTP produced higher reading scores.

Stronger intrinsic motivation was associated with stronger dispositional FTP,  $B = 0.42$ ,  $p = 0.03$ , while stronger extrinsic motivation was associated with stronger dispositional FTP,  $B = 0.48$ ,  $p = 0.02$ , and was caused by future-oriented drawing,  $B = 0.58$ ,  $p = 0.02$ . Stronger amotivation was associated with weaker dispositional FTP in Model three but not in the final model. Overall, the predictors explained 7–23% of the variances of the academic outcomes.

To examine the potential bias due to the uneven allocation of boys and girls into the conditions, we examined whether gender moderated the effects of the manipulation and its interaction. No significant gender interaction effects were found (**Table 3** in supporting information). In addition, we conducted sensitivity analyses by including all observations ( $N = 111$ ) to see how the decision of removing cases, potentially with lower quality, might affect the results. The patterns of the results remained largely the same (**Table 4** in supporting information). However, some significant coefficients became marginally significant ( $p = 0.05$ – $0.10$ ).

## DISCUSSION

This study examined the effects of dispositional FTP, instructional FTP, and their interaction on academic outcomes among primary school students. Stronger dispositional FTP was associated with stronger intrinsic and extrinsic motivation. Future-oriented instructional context led to stronger extrinsic motivation than present-oriented context. Time perspective concordance contributed to stronger reading performance, but not academic motivations.

**TABLE 1 |** Sample characteristics by experimental conditions (N = 92).

	Range	$\alpha$ /KR-20	Present condition		Future condition		t-test/ $\chi^2$ test
			Mean/%	SD	Mean/%	SD	
Age	7–10	—	8.03	0.77	8.08	0.68	$t(90) = -0.34, p = .73$
Girl	0–1	—	60%	—	33%	—	$\chi^2(1) = 6.82, p = .009$
Reading frequency	1–5	—	3.62	1.05	3.62	1.29	$t(90) = 0.00, p = 1.00$
Future time perspective	1–5	0.67	3.57	0.45	3.45	0.54	$t(90) = 1.18, p = .24$
Reading score	0–8	0.70 <sup>a</sup>	4.85	1.79	4.71	2.07	$t(90) = 0.34, p = .74$
Intrinsic motivation	1–7	0.70	4.92	1.07	5.01	1.05	$t(90) = -0.41, p = .68$
External motivation	1–7	0.75	4.71	1.30	5.22	0.93	$t(90) = -2.15, p = .03$
Amotivation	1–7	0.61	2.05	1.27	2.67	1.49	$t(90) = -2.10, p = .04$
Sample size	—	—	40	—	52	—	—

<sup>a</sup>Kuder-Richarson coefficient of reliability was used for binary items.

**TABLE 2 |** Regression coefficients of the multilevel linear models (N = 92).

	Model 1	Model 2	Model 3	Model 4	Model 5
<b>Reading Score (ICC = 29%)</b>					
Constant	4.51***	-1.60	-1.21	-1.33	-0.61
Age	—	0.55	0.53	0.53	0.47
Girl	—	0.62	0.60	0.65	0.51
Reading frequency	—	0.42**	0.36*	0.35*	0.35*
Dispositional FTP	—	—	0.23	0.24	-0.30
Future drawing	—	—	—	0.17	0.04
FTP × Future drawing	—	—	—	—	0.84*
R <sup>2</sup>	—	18.51%	19.01%	18.28%	22.96%
<b>Intrinsic motivation (ICC = 0%)</b>					
Constant	4.97***	3.30*	3.73*	3.71*	3.49*
Age	—	0.15	0.13	0.13	0.15
Girl	—	-0.40	-0.42	-0.41	-0.37
Reading frequency	—	0.19	0.11	0.11	0.11
Dispositional FTP	—	—	0.24*	0.24*	0.42*
Future drawing	—	—	—	0.03	0.07
FTP × Future drawing	—	—	—	—	-0.27
R <sup>2</sup>	—	5.02%	8.51%	7.46%	7.91%
<b>Extrinsic motivation (ICC = 0%)</b>					
Constant	5.00***	3.47*	3.91*	3.64*	3.38*
Age	—	0.20	0.18	0.18	0.20
Girl	—	-0.20	-0.22	-0.07	-0.02
Reading frequency	—	0.00	-0.08	-0.10	-0.10
Dispositional FTP	—	—	0.25	0.28*	0.48*
Future drawing	—	—	—	0.54*	0.58*
FTP × Future drawing	—	—	—	—	-0.31
R <sup>2</sup>	—	-0.62%	2.46%	6.84%	7.46%
<b>Amotivation (ICC = 12%)</b>					
Constant	2.48***	5.55**	4.68*	4.70*	4.85*
Age	—	-0.19	-0.13	-0.16	-0.17
Girl	—	-0.48	-0.44	-0.32	-0.35
Reading frequency	—	-0.39**	-0.28*	-0.31*	-0.31*
Dispositional FTP	—	—	-0.33*	-0.30	-0.41
Future drawing	—	—	—	0.46	0.43
FTP × Future drawing	—	—	—	—	0.18
R <sup>2</sup>	—	14.62%	17.65%	19.62%	19.05%

\*p < .05.

\*\*p < .01.

\*\*\*p < .001.

Note. FTP = future time perspective, ICC = intraclass correlation in the multilevel null model. R<sup>2</sup> reflects the proportion of total outcome variance explained by level-1 predictors.

## Effects of Dispositional FTP

Consistent with previous studies (Avci, 2013; De Bilde et al., 2011; Wininger and DeSena, 2012), stronger dispositional FTP

was associated with stronger intrinsic and extrinsic motivation. It was also associated with weaker amotivation before adding the instructional FTP into the prediction. The findings

**TABLE 3 |** Moderating effects of gender on academic outcomes (N = 92).

	Reading score	Intrinsic motivation	Extrinsic motivation	Amotivation
Constant	-0.70	3.17*	3.62*	4.97*
Age	0.47	0.16	0.19	-0.19
Reading frequency	0.34*	0.08	-0.13	-0.29*
Girl	0.65	0.00	-0.09	-0.41
Effects of time perspective				
Dispositional FTP	-0.18	1.16**	0.74	-0.88
Future drawing	0.23	0.38	0.49	0.40
FTP x Future drawing	0.90	-1.01**	-0.66	0.66
Gender moderating effects				
Girl x FTP	-0.14	-1.01*	-0.36	0.66
Girl x Future drawing	-0.05	-0.46	0.11	-0.05
Girl x FTP x Future drawing	-0.98	1.12	1.01	-0.73
R <sup>2</sup>	21.40%	11.56%	8.00%	17.95%

\*p &lt; .05.

\*\*p &lt; .01.

\*\*\*p &lt; .001.

Note. FTP = future time perspective. R<sup>2</sup> reflects the proportion of total outcome variance explained by level-1 predictors.

supported again that a strong dispositional FTP may strengthen the instrumentality of present behaviors (Peetsma and van der Veen, 2011) and facilitate the internalization of the distal and external benefits (Husman and Lens, 1999; Lasane and Jones, 1999). This study was unique as the relationships were found in primary school students aged 7–10. It suggests that at least some children at this age are cognitively capable to understand the concept of future. This may also reflect that children in Hong Kong (like other Asian cities such as Seoul and Singapore) may be well socialized to consider the future consequences of their studying behaviors. A qualitative study among lower primary school students in Hong Kong showed that parents often link examination success to future opportunities such as getting promising jobs, having better earning power, going to nicer secondary schools and universities (Carless and Lam, 2014).

### Effects of Instructional FTP

The current experimental design allowed the test of causal relationships between instructional FTP and academic outcomes. Compared with a present-oriented activity, we found that a brief future-oriented learning activity was able to increase extrinsic motivation ( $B = 0.58$ ), but not intrinsic motivation ( $B = 0.07$ ). In a future-oriented instructional context, future and external rewards may become readily identifiable and bring up the instrumentality of the present studying behaviors immediately. However, internalizing these external rewards such that they match with one's personal interests is an intentional and proactive process (Ryan and Deci, 2017), which may evolve over time. The non-significant effect on amotivation might be due to its weaker effect ( $B = 0.43$ ) being tested with a small sample size. Amotivation may also be a rather stable construct that is harder to change (Vallerand et al., 1993). In addition, we suspect that the developing cognitive capacity of children at this age may make them more receptive to instructional FTP than older children or young adults. Thus, the effects of instructional FTP should be tested in other age groups.

### Time Perspective Concordance

The effects of time perspective concordance were shown on reading scores but not academic motivations. As shown in previous studies (Dimmock et al., 2013; Orbell and Hagger, 2006; Orbell and Kyriakaki, 2008), the cognitive responses and behavioral intentions would benefit from the congruence between dispositional time perspective and temporally framed messages. Consistently, the “studying hard” behavior, as reflected in the performance in the reading task, was better with time perspective concordance. Language ability and memory were unlikely to change given the brief manipulation. Attention was more likely to be the mediator of the better performance. While stronger cognitive effort might be given to the reading task for those who drew a temporally congruent picture, those who drew an incongruent picture might have some cognitive resources drained by the cognitive strategies to resolve the dissonance (McGrath, 2017). Both processes might contribute to the differences observed.

The time perspective concordance effects on academic motivations were not found. We suspected that a potential ceiling effect might have counteracted the concordance effects. Specifically, the future drawing might not be able to increase the academic motivations further when both dispositional FTP and academic motivations were high. On the other hand, the future drawing had much room to enhance the academic motivations when both dispositional FTP and academic motivations were low. Thus, a discordance effect might be possible.

### Limitations

There were several limitations. First, only FTP, among other time-perspective dimensions such as past or present, was examined. For instance, past achievements may be considered as sources of self-efficacy for further learning (Bowles, 1999). Future studies may examine other time perspectives. Second, the drawing task was one possible time-based learning activity. The extent to which the results can be applied to other time-based learning activities requires further investigation. Third, the current design could only reflect the immediate cognitive

**TABLE 4 |** Regression coefficients of the multilevel linear models (N = 111).

	Model 1	Model 2	Model 3	Model 4	Model 5
Reading Score (ICC = 30%)					
Constant	4.50***	-1.46	-0.96	-0.94	-0.88
Age	—	0.53†	0.51†	0.50†	0.50†
Girl	—	0.52†	0.50	0.52†	0.51†
Reading frequency	—	0.43**	0.35*	0.35*	0.34*
Dispositional FTP	—	—	0.28†	0.29†	0.00
Future drawing	—	—	—	0.12	0.11
FTP × Future drawing	—	—	—	—	0.52†
R <sup>2</sup>	—	18.84%	20.16%	19.58%	21.85%
Intrinsic motivation (ICC = 0%)					
Constant	4.98***	3.55*	3.97**	3.96**	3.91**
Age	—	0.12	0.10	0.11	0.11
Girl	—	-0.38†	-0.41*	-0.42*	-0.41*
Reading frequency	—	0.18†	0.10	0.10	0.11
Dispositional FTP	—	—	0.25*	0.25*	0.36*
Future drawing	—	—	—	-0.03	-0.03
FTP × Future drawing	—	—	—	—	-0.19
R <sup>2</sup>	—	4.11%	8.41%	7.56%	7.53%
Extrinsic motivation (ICC = 0%)					
Constant	5.02***	3.88*	4.22**	4.31**	4.26**
Age	—	0.15	0.13	0.10	0.10
Girl	—	-0.18	-0.20	-0.12	-0.12
Reading frequency	—	0.01	-0.04	-0.06	-0.06
Dispositional FTP	—	—	0.20†	0.22†	0.33†
Future drawing	—	—	—	0.38†	0.38†
FTP × Future drawing	—	—	—	—	-0.19
R <sup>2</sup>	—	-1.03%	0.84%	2.74%	2.55%
Amotivation (ICC = 10%)					
Constant	2.47***	5.25**	4.67**	4.87**	4.95**
Age	—	-0.16	-0.13	-0.18	-0.18
Girl	—	-0.48†	-0.44†	-0.37	-0.37
Reading frequency	—	-0.37**	-0.27*	-0.29*	-0.30*
Dispositional FTP	—	—	-0.36**	-0.33*	-0.40*
Future drawing	—	—	—	0.39	0.39
FTP × Future drawing	—	—	—	—	0.13
R <sup>2</sup>	—	13.71%	18.83%	20.08%	19.57%

\*p &lt; .05.

\*\*p &lt; .01.

\*\*\*p &lt; .001.

†p &lt; .01.

Note. FTP = future time perspective, ICC = intraclass correlation in the multilevel null model. R<sup>2</sup> reflects the proportion of total outcome variance explained by level-1 predictors.

efforts devoted to academic tasks. The enduring effects of time-based instructions should be examined in future studies. Fourth, the randomization yielded biased gender distribution. Fortunately, gender did not moderate the results. Fifth, 19 out of the 111 students failed the quality checking item. Younger students might have difficulties in following the experimental instructions. In addition, the present-drawing effects might be overshadowed by the preconception that “studying hard” is future-oriented in the Hong Kong context. Thus, those in the present condition were more likely to fail the quality checking. Sixth, reading comprehension did not adequately reflect academic performance. Future studies should consider a more comprehensive assessment.

## Implications and Conclusion

Theoretically, the findings showed the relationships between dispositional FTP and academic outcomes could be extended

to children aged 7–10. Instructional FTP was able to alter academic motivations. The effects of time perspective concordance were supported in performance tasks. Practically, it is important to reflect on the effect of teachers time perspective on students academic outcomes (Husman et al., 2015). Teachers instructions and school policies may overly emphasize a sense of FTP, in which present-oriented students may be disadvantaged. While the internalization of extrinsic motivation is essential to sustain students' volition to academic activities that are not inherently interesting (Niemic and Ryan, 2009), teachers are encouraged to balance the time-based activities such that students will not give up their efforts or motivation at an early age. Activities can also be tailored to students with different dispositional FTP. Students may also be allowed the autonomy to choose the activities that match with their dispositional FTP. For instance, students may choose their drawing, writing, or problem-based projects on a present or future issue.

## DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by College Human Subjects Ethics Sub-Committee, College of Liberal Arts and Social Sciences, City University of Hong Kong. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

## AUTHOR CONTRIBUTIONS

KL: Conceptualization, Methodology, Formal analysis, Writing - Original Draft, Supervision. HV: Conceptualization, Methodology, Data Curation, Formal analysis, Writing - Original Draft. YN: Formal analysis, Writing - Review and Editing.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2021.771740/full#supplementary-material>

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