

Validating Brief Life Design Measures: Structural Relationships Among Career Beliefs, Self-Efficacy, and Flourishing in Singapore

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Abstract: Although Stanford's Life Design curriculum has been adopted by over 500 educational institutions worldwide to build students' lifelong career agency, empirical validation of its foundational components remains limited. The present study provides the first validation of shortened Life Design measures and structural test of the Life Design framework in an Asian polytechnic context. A total of 1,115 polytechnic students in Singapore responded to brief measures of certainty-oriented career beliefs, career development self-efficacy, and flourishing. Confirmatory factor analyses supported the factor structures of all three measures, and the structural model showed good fit. Certainty-oriented career beliefs were positively associated with career development self-efficacy, which in turn was associated with flourishing, whereas the direct association between beliefs and flourishing was nonsignificant. Overall, these findings extend Life Design's proposed mediating pathway to an Asian polytechnic context while indicating that the role of certainty-oriented career beliefs is culturally contingent rather than uniformly maladaptive.

Introduction

Globally, education systems continue to prepare students for careers in an economy undergoing substantial change, a context associated with concerns about mental health and workforce preparedness (OECD, 2025). As artificial intelligence (AI) shifts from experimentation to integration, the pace and trajectory of its development increase the uncertainty about its effects on business operations, labor markets, and the global economy (World Economic Forum, 2025).

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Traditional models of career development, which prioritize linear person–environment fit, have struggled to keep pace with these disruptions and remain conceptually misaligned with contemporary labor market realities (De Vos et al., 2020; Lent et al., 1994). Life Design, conceptualized by Burnett and Evans (2016) at the Stanford Life Design Lab (Dosi et al., 2018), represents a paradigm shift in career development with an explicit focus on human flourishing (OECD, 2025). The Life Design framework integrates design thinking with positive psychology for lifelong career development. It aims to cultivate curiosity and reframe limiting beliefs to support prototyping and experimentation. These practices enable

individuals to shape purposeful life and career trajectories through close collaboration with others (Burnett & Evans, 2016). Central to the framework is the premise that students' career beliefs, defined as their assumptions about how career decisions should be made and acted upon (Krumboltz, 1994), shape their career development self-efficacy (CDSE), which, in turn, is associated with flourishing, understood here as holistic well-being spanning positive emotion, engagement, relationships, meaning, accomplishment, and health (Butler & Kern, 2016; Seligman, 2011). The terms flourishing and well-being are used interchangeably here, consistent with their treatment in the positive psychology literature (Butler & Kern, 2016; Seligman, 2011). This ordering, in which flourishing is the distal construct, is consistent with both frameworks underlying this study. Life Design treats well-being, not employment alone, as its endpoint (Burnett & Evans, 2016). Social Cognitive Career Theory (SCCT) offers a corresponding account: beyond the interest, choice, and performance models (Lent et al., 1994), Lent (2004) proposed a social cognitive model of well-being in which self-efficacy is positioned as an antecedent of domain and life satisfaction rather than as an endpoint, consistent with associations reported in a meta-analysis of samples of university students (Mohd Rasdi & Ahrari, 2020). CDSE refers to perceived capability to execute career-development tasks, including exploring options, gathering occupational information, and solving career-related problems (Betz & Luzzo, 1996; Oishi, 2012). Importantly, this study does not assume that certainty-oriented career beliefs are uniformly maladaptive. Developmental research suggests that commitments made without extensive exploration can be associated with relatively high self-esteem and low anxiety, particularly when the surrounding social context reinforces those commitments, although this adjustment may be fragile (Kroger & Marcia, 2011).

Accordingly, certainty-oriented career beliefs are treated here as a theoretically ambiguous construct whose implications depend on context and mechanism. Examining these relationships before exposure to any intervention establishes a necessary baseline for interpreting later change.

Theoretical Integration: Prototyping as a Catalyst for CDSE

Career development is conceptualized as a lifelong, iterative process in which an individual's self-concept and vocational identity evolve continuously (Super, 1980). Central to this evolution is self-efficacy, which is shaped by four primary sources: mastery experiences, vicarious learning, social persuasion, and physiological states (Bandura, 1997). Within SCCT (Lent et al., 1994), mastery experiences are the primary source of self-efficacy, providing direct evidence of one's capability. In Life Design, such evidence is generated through exercises such as Odyssey Plans, in which students envision three possible future selves rather than committing prematurely to a single path (Burnett & Evans, 2016). In this respect, the two frameworks are complementary: SCCT specifies self-efficacy formation as the psychological mechanism that Life Design's prototyping approach is designed to activate.

According to Burnett and Evans (2016), prototyping serves as the primary behavioral strategy for reducing vocational uncertainty. Within this framework, prototyping involves creating low-stakes experiments to test different life paths envisioned in the Odyssey Plans and gather information about relevant environments. By talking to people whose lives resemble those they envision or engaging in small-scale activities, such as shadowing or side projects, students can test their Odyssey Plans. These activities serve as a pedagogical bridge: Life Design conversations facilitate vicarious learning through observation of others' experiences, whereas active shadowing provides the direct mastery experiences required to update a student's self-concept.

By reframing potential failures as opportunities for iterative data collection, this process reduces the psychological burden of career decision-making and fosters the mastery experiences necessary to bolster CDSE (Burnett & Evans, 2016; Lent et al., 1994). Consequently, the Life Design paradigm suggests that career maturity is defined not by a single definitive decision but by the ongoing capacity for adaptation and meaning-making (De Vos et al., 2020). From a sustainability perspective, careers unfold through a cyclical, self-regulatory process (Lord & Maher, 1990) in which individuals interpret and respond to dynamic experiences. These meaning-making processes, shaped by interactions with different stakeholders, provide the basis for dynamic learning across the career lifespan (De Vos et al., 2020).

According to Davis et al. (2025), Stanford's Life Design Lab programming has been adopted by more than 500 institutions, yet the literature lacks rigorous empirical evaluation of its outcomes. Very few studies have validated the program's core psychological constructs, and, to our knowledge, none have examined its applicability in Asian contexts.

Aims of This Study

This study addresses these gaps by providing the first measurement validation and structural test of the Life Design framework at a polytechnic in Singapore. Specifically, we pursue two aims:

1. **Measurement Validation:** To establish the psychometric validity of the Brief Life Design Measures (BLDM), which assess three foundational Life Design constructs: certainty-oriented career beliefs, CDSE, and student flourishing.

2. **Structural Evaluation:** To evaluate the Life Design structural pathway using structural equation modeling (SEM) to test whether certainty-oriented career beliefs are indirectly associated with student flourishing through CDSE.

Given Singapore's high-stakes, achievement-driven educational culture and the traditional premium placed on early career clarity (Chan & Ng, 2025), we do not assume that the Western Life Design framework or Western assumptions about the adaptiveness of certainty will generalize directly to the Singaporean context. By empirically testing these relationships, we provide the essential groundwork for culturally responsive career interventions and contribute to the expanding body of Life Design research across Asia.

Method

Research Design

This study employed a cross-sectional quantitative design to evaluate the psychometric properties and structural relationships among certainty-oriented career beliefs, CDSE, and flourishing. The analysis proceeded in two distinct phases. First, to ensure a parsimonious assessment suitable for the target population, a shortened version of the established instruments was validated using confirmatory factor analysis (CFA). This phase examined factor structure, internal reliability, and convergent and discriminant validity to establish psychometric soundness.

Second, SEM (Kline, 2023) was used to evaluate the hypothesized Life Design mechanism. Specifically, the model tested whether certainty-oriented career beliefs showed an indirect association with student flourishing via CDSE. This two-step approach, validating the measurement model before testing the structural paths, was adopted to minimize structural bias and ensure the robustness of the mediation results.

Participants

Overall, 1,115 students from a large, publicly funded polytechnic in Singapore participated in this study. The sample included students from diverse academic disciplines, including business, engineering, health sciences, and humanities. Participation was voluntary, and the study was

approved by the Institutional Review Board of Republic Polytechnic. The sample comprised 629 male students (56.4%) and 486 female students (43.6%). Age was recorded in ordinal categories, with the majority aged 17 years or younger (57.3%), followed by those aged 18 years (16.1%), 19 years (9.5%), 20 years (8.7%), and 21 years or older (8.4%).

Measures

The survey included shortened forms of three established instruments assessing (a) certainty-oriented career beliefs, (b) CDSE, and (c) flourishing. We refer to this integrated battery as the BLDM. Full details of the items are provided in Appendix A. The three instruments were shortened before the present study using an independent pilot study conducted with an earlier cohort from the same institution. Because the pilot and present samples were drawn from distinct cohorts, the pilot served solely to finalize item selection; its psychometric results are not reported here, and all measurement properties reported in this study were established independently in the present sample ($N = 1,115$). The shortened forms were selected to improve the feasibility of survey administration and reduce respondent burden in a context where students are routinely invited to participate in multiple institutional surveys. This refinement was intended to mitigate survey fatigue and enhance data quality while maintaining the conceptual integrity and psychometric adequacy of the measurement scales (Galesic & Bosnjak, 2009; Kruijen et al., 2013).

Item pools for the certainty-oriented career beliefs and CDSE scales were first reduced through expert consultation with the scale author (Oishi, 2012) to remove low-priority or conceptually overlapping items. All three item pools, including the flourishing items, were then administered together in the pilot study. Items were retained if they loaded at least .50 on their intended factor and were conceptually relevant to the construct, with theoretically essential

items eligible for retention as exceptions to the loading threshold. For the certainty-oriented career beliefs scale, items with low factor loadings were removed while retaining one item judged essential to the construct's conceptual coverage, yielding six items. For the CDSE scale, retention prioritized the process- and exploration-oriented facets central to the Life Design framework, yielding nine items; the shortened form therefore emphasizes action-based self-efficacy rather than self-appraisal. For the flourishing scale, the lowest-loading item in each facet was removed, preserving balanced representation across the positive emotion, engagement, relationships, meaning, accomplishment, and health (PERMAH) facets; consistent with Butler and Kern (2016), the single global happiness item was retained in the survey but modeled as a standalone index rather than as an indicator of the latent construct of flourishing, yielding 13 administered items and 12 latent indicators.

Certainty-Oriented Career Beliefs

Certainty-oriented career beliefs refer to expectations that career development requires making clear, confident, and enduring career decisions early in life; that such decisions are largely irreversible in their consequences; and that careful planning and certainty lead to successful career outcomes. These beliefs were assessed using a shortened six-item scale. The items assess the expectations that one must establish a definitive long-term plan early or that current decisions irrevocably determine one's future trajectory. Such expectations stand in tension with developmental perspectives that view emerging adulthood as a stage for exploration rather than premature commitment (Super, 1980) and with accounts of career sustainability that emphasize dynamic learning, in which individuals continuously refine their understanding of themselves and the labor market (De Vos et al., 2020).

Oishi (2012) originally labeled the scale the "Dysfunctional Beliefs Scale," but we adopt the

term Certainty-Oriented Career Beliefs. The original label reflects the theoretical tradition underlying the scale, in which certainty-oriented beliefs are treated as maladaptive career cognitions (Krumboltz, 1994). That label characterizes the presumed implications of the beliefs rather than the content of the items, which assess the strength of certainty-oriented assumptions. Retaining it in a study examining whether those beliefs relate positively or negatively to CDSE would presuppose the outcome under examination. The present term therefore describes the item content, namely the expectation of early career clarity (e.g., “I should be sure of my professional plans and goals before I do anything”). Reframing such assumptions to promote more adaptive habits of thought is a core tenet of Life Design (Burnett & Evans, 2016), grounded in Cognitive Behavioral Therapy (Hofmann et al., 2012).

CDSE

CDSE refers to perceived capability to carry out career-development tasks, including exploring options, gathering occupational information, and solving career-related problems (Betz & Luzzo, 1996; Oishi, 2012). A shortened nine-item scale assessed this construct (e.g., “Make a plan for exploring your career over the next five years”), with participants rating how confident they were that they could perform each task. Within SCCT (Lent et al., 1994) and Bandura’s (1997) self-efficacy theory, interests are not fixed antecedents but are shaped by self-efficacy and learning experiences; the scale therefore indexes perceived capability to evaluate, explore, and select options rather than to attain terminal career outcomes. In the Life Design framework, prototyping provides a practical route to the mastery experiences that build career development agency (Oishi, 2012).

Flourishing

Flourishing is understood as a state of optimal psychosocial functioning reflected across multiple domains of well-being: PERMA,

extended here to include health (Butler & Kern, 2016; Seligman, 2011). Flourishing was quantified using a shortened 13-item scale aligned with the PERMA framework. The original PERMA-Profiler comprises 15 core items across five domains, with additional items assessing overall well-being, negative emotion, loneliness, and physical health (Butler & Kern, 2016). In this study, we retained two physical-health items and modeled them as a health facet, extending PERMA to PERMAH. This extension is theoretically informed. Although PERMA centers on psychosocial functioning, physical health is closely linked to flourishing both conceptually and empirically (Friedman & Kern, 2014; Norrish, 2015), and Butler and Kern (2016) themselves report health as a distinct index within the PERMA-Profiler. Health is also relevant to the career-development focus of the present study because health and disability status are among the person inputs that shape career-related learning and choice within SCCT (Lent et al., 1994).

Procedure

The study protocol was approved by the Institutional Review Board of Republic Polytechnic. All participants provided written informed consent before participation. Participation was voluntary, and participants were free to withdraw at any time without penalty. A total of 1,115 students completed a 28-item online survey (see Appendix A for the full set of items) hosted on the institution’s secure data-collection platform. They were assured that their responses would remain anonymous and confidential and that all data would be used solely for research purposes and reported only in aggregate form.

Analysis Techniques

Data analysis was conducted in R (v4.4.3) using the lavaan package (Rosseel, 2012) for SEM. Following the two-step approach, CFA was used to validate the shortened scales before estimating the structural model. The survey

platform mandated a response to every item, yielding complete data with no missing values across all analyzed items ($N = 1,115$); models were therefore estimated using maximum likelihood estimation with robust standard errors (MLR) without requiring missing-data adjustment. Model fit was assessed using the comparative fit index ($CFI > .90$), Tucker–Lewis index ($TLI > .90$), root mean square error of approximation ($RMSEA < .08$), and standardized root mean square residual ($SRMR < .08$).

Beyond CFA, we evaluated the dimensionality of the flourishing indicators, as the appropriate representation of the PERMA-Profiler in a shortened, two-indicator-per-facet battery was not assumed a priori. Four competing measurement models were specified, each corresponding to a distinct hypothesis about the latent structure: (a) a single general flourishing factor, testing strict unidimensionality; (b) the same factor with correlated residuals justified by shared PERMAH facet content; (c) five correlated PERMA factors with health items excluded, reproducing the original PERMA-Profiler structure (Butler & Kern, 2016); and (d) six correlated PERMAH factors, testing whether the facets, including health, functioned as separable dimensions. Models were compared using robust fit indices (CFI , TLI , $RMSEA$, $SRMR$) and, among specifications sharing the same indicators, the Bayesian information criterion (BIC). Composite reliability was indexed by McDonald's ω (Flora, 2020).

Both certainty-oriented career beliefs and CDSE were treated as unidimensional; residual covariances were considered for inclusion when modification indices suggested potential improvement in model fit, provided that each addition was justified on both theoretical and statistical grounds.

Discriminant Validity

Discriminant validity among the three constructs assessed by the BLDM was evaluated

in two ways (Anderson & Gerbing, 1988). First, the 95% confidence intervals (CIs) for the latent factor correlations from the three-factor measurement model were examined, with intervals excluding 1.0 taken as evidence of construct distinctiveness. Second, the three-factor model was compared with three two-factor alternatives, each combining one pair of constructs into a single latent factor, and with a one-factor model collapsing all indicators onto a single dimension. Correlated residuals were held constant across specifications so that each alternative was nested within the three-factor model, permitting scaled χ^2 difference tests.

Mediation Testing

The hypothesized mediation model specified CDSE as the mediator between certainty-oriented career beliefs and flourishing. The hypothesized ordering, with flourishing as the distal construct, was specified before data collection. Indirect effects were tested using 5,000 bootstrap draws with bias-corrected CIs (all 5,000 draws converged). Because bootstrap standard errors are incompatible with the robust corrections applied under MLR, the bootstrap model was estimated with maximum likelihood; all reported fit indices are derived from the MLR specification. To evaluate the robustness of the hypothesized direction, two alternative structural specifications were tested as robustness checks rather than a priori predictions: a direct-effects-only model in which the mediating path was fixed to zero and a reversed-direction model. These alternatives were compared with the hypothesized model using fit indices and, where nested, scaled χ^2 difference tests.

Non-Linear Effects

As an exploratory extension, we tested whether certainty-oriented beliefs were nonlinearly related to CDSE and flourishing. Quadratic effects were tested at the composite level via hierarchical regression and evaluated at the latent level using a double-mean-centered

product-indicator approach (Lin et al., 2010; Marsh et al., 2004). Because latent quadratic estimates are sensitive to how product indicators are formed, four indicator-construction strategies were evaluated by comparing model fit and solution admissibility. Following double-mean centering, product indicators were formed by multiplying three disjoint pairs of belief items ($A1 \times A2$, $A3 \times A4$, $A5 \times A6$), with each item used once. The linear and quadratic factors were nearly uncorrelated ($r = -.10$), confirming that the centering had eliminated their dependence.

Results

We report the findings in the following order: dimensionality testing, CFA, and model comparison.

Dimensionality Testing

We evaluated the dimensionality of the flourishing scale. A strictly unidimensional model fit the data poorly ($CFI = .847$, $RMSEA = .135$). Introducing three correlated residuals justified by shared PERMAH facet content yielded acceptable fit ($CFI = .963$, $RMSEA = .069$). The five- and six-factor models also fit well; however, several interfactor correlations were high (six-factor: $R-M = .93$, $E-R = .91$), indicating limited separability among the engagement, relationships, and meaning facets. Health was the most distinct facet, with correlations with the other facets ranging from .58 to .68, consistent with its treatment as a separate index in the PERMA-Profiler (Butler & Kern, 2016). The PERMAH facets were highly intercorrelated (up to $r = .93$), and each facet was represented by only two indicators, limiting the stability of a six-factor solution. Consequently, flourishing was modeled as a general flourishing factor, with the three strongest within-facet residual correlations for health (C12–C13), positive emotion (C3–C5), and accomplishment (C1–C4) retained. This specification was selected for parsimony and

identification rather than superior fit. Although the six-factor model fit marginally better according to the incremental indices ($CFI = .973$ vs. $.963$), the models had nearly identical BIC values (26,760 vs. 26,764), which did not favor the more complex structure.

Measurement Model and Psychometric Properties

We then evaluated the measurement model for each construct (Table 1). Fit ranged from acceptable for certainty-oriented career beliefs ($CFI = .961$, $TLI = .934$, $RMSEA = .080$) to excellent for CDSE ($CFI = .979$, $TLI = .971$, $RMSEA = .065$), with flourishing showing good fit ($CFI = .963$, $TLI = .952$, $RMSEA = .069$); the latter two models included theoretically justified residual correlations. SRMR values fell below .08 for all three constructs. Internal consistency was strong throughout, with Cronbach's α and McDonald's ω both ranging from .79 to .92. One flourishing item (engagement, C2) loaded slightly below the .50 retention threshold ($\lambda = .47$) and was retained to preserve the theoretical coherence of the PERMAH framework, consistent with the approach of Butler and Kern (2016). The four residual correlations corresponded to content-based item overlap within scales: the two health items (C12–C13), two positive emotion items (C3–C5), two accomplishment items (C1–C4), and two career-information-search items on the self-efficacy scale (B2–B3). Freeing these residual covariances improved model fit without altering the statistical significance or direction of the structural paths.

Table 1

Measurement Model Fit and Reliability

Construct	CFI	TLI	RMSEA	SRMR	Cronbach's α	ω	Factor Loadings (λ)
a. Certainty-Oriented Career Beliefs	.961	.934	.080	.033	.79	.79	.54–.72
b. CDSE *	.979	.971	.065	.024	.92	.92	.70–.79
c. Flourishing *	.963	.952	.069	.037	.91	.91	.47–.82

* Models marked with an asterisk were refined by allowing correlated residuals within components

Discriminant Validity

The three-factor measurement model fit the data well (CFI = .955, RMSEA = .044; see Structural Model for full indices). Latent correlations were .41 (95% CI [.33, .49]) between certainty-oriented career beliefs and CDSE, .30 (95% CI [.22, .38]) between certainty-oriented career beliefs and flourishing, and .58 (95% CI [.52, .64]) between CDSE and flourishing. All CIs excluded 1.0 by a wide margin.

The three-factor model also fit better than every more restrictive alternative. Merging certainty-oriented career beliefs with CDSE degraded fit substantially (CFI = .876, RMSEA = .073; scaled $\Delta\chi^2(2) = 821.59, p < .001$), as did merging certainty-oriented career beliefs with flourishing (CFI = .863, RMSEA = .077; scaled $\Delta\chi^2(2) = 825.98, p < .001$). Merging CDSE with flourishing produced the poorest two-factor fit of the three (CFI = .802, RMSEA = .092; scaled $\Delta\chi^2(2) = 1333.19, p < .001$), indicating that the two most strongly associated constructs remain clearly separable rather than redundant. The one-factor model fit poorly (CFI = .724, RMSEA = .109; scaled $\Delta\chi^2(3) = 1634.60, p < .001$). Together, these results support the distinctiveness of all three constructs.

Preliminary Analyses

Before testing the structural model, we examined the distributional properties, **Table 2**

descriptive statistics, and zero-order correlations among the three constructs (Table 2). Skewness and excess kurtosis were negligible for all three constructs, indicating no substantial departure from univariate normality (Kline, 2023). All three constructs were positively and significantly intercorrelated ($p < .001$). CDSE showed the strongest association with flourishing ($r = .54$), followed by a weaker association with certainty-oriented career beliefs ($r = .34$); the association between certainty-oriented career beliefs and flourishing was the weakest ($r = .25$). All correlations were below .85, indicating no evidence of multicollinearity.

Means, Standard Deviations, Distributional Properties, and Zero-Order Correlations Among Study Variables

Variable	M	SD	Skew	Kurt	1	2	3
1. Certainty-oriented career beliefs	3.64	0.65	-0.12	0.17	(.79)		
2. CDSE	3.58	0.68	-0.26	0.37	.34***	(.92)	
3. Flourishing	3.49	0.61	0.01	0.25	.25***	.54***	(.91)

Note. $N = 1,115$. Cronbach's α values are shown on the diagonal in parentheses. Skew = skewness; Kurt = excess kurtosis. All variables were scored on a five-point scale. *** $p < .001$.

Overall Structural Model Fit and Mediation Analysis

Next, we assessed the hypothesized mediation model; Table 3 presents the results. The hypothesized mediation model demonstrated good overall fit (scaled $\chi^2(317) = 828.42$, $p < .001$; CFI = .955; TLI = .950; RMSEA = .044, 90% CI [.041, .048]; SRMR = .053). The statistically significant χ^2 is expected given the large sample size ($N = 1,115$), as larger samples improve the ability to detect small model misspecifications; the approximate fit indices, which are less sensitive to sample size, indicate that the model represents the data well (Kline, 2023). As presented in Table 3 (Panel A), certainty-oriented career beliefs were significantly associated with CDSE ($B = 0.45$, $SE = 0.05$, 95% CI [.035, 0.55], $\beta = .41$, $p < .001$). In turn, CDSE was significantly associated with flourishing ($B = 0.62$, $SE = 0.05$, 95% CI [.051, 0.73], $\beta = .55$, $p < .001$), representing the strongest structural path in the model.

When CDSE was included in the model, the direct association between certainty-oriented career beliefs and flourishing was nonsignificant ($B = 0.09$, $SE = 0.05$, 95% CI [-0.001, 0.18], $\beta = .07$, $p = .054$). The indirect effect was significant ($B = 0.28$, $SE = 0.04$, 95% CI [.021, 0.35], $\beta = .23$, $p < .001$) and accounted for 75.7% of the significant total effect ($B = 0.37$, $SE = 0.06$, 95% CI [.026, 0.48], $\beta = .30$, $p < .001$); the proportion mediated was computed from the

unstandardized estimates. The model accounted for 16.7% of the variance in CDSE ($R^2 = .167$) and 34.0% of the variance in flourishing ($R^2 = .340$), the latter reflecting the joint contribution of both predictors. Overall, these results support a predominant mediation model, indicating that certainty-oriented career beliefs were indirectly associated with flourishing predominantly through CDSE.

Comparison with Alternative Structural Models

To evaluate whether the hypothesized model provided the best account of the data, two alternative specifications were tested as robustness checks rather than as a priori predictions (Table 3, Panel B). Model B, a direct-effects-only model in which the mediating path was fixed to zero, fit significantly worse than the hypothesized model, scaled $\Delta\chi^2(1) = 596.25$, $p < .001$, with SRMR increasing from .053 to .125; CDSE therefore contributed substantively to the model rather than being redundant. Model A, a reversed specification (flourishing $\rightarrow$ CDSE $\rightarrow$ certainty-oriented career beliefs), produced fit indices identical to those of the hypothesized model.

Table 3

Structural Model Results: Path Coefficients and Competing Model Comparisons

<i>Panel A. Path coefficients (hypothesized predominant mediation model)</i>					
Path	<i>B</i>	<i>SE</i>	95% CI	β	<i>p</i>
Certainty-oriented career beliefs → CDSE (a)	0.45	0.05	[0.35, 0.55]	.41	< .001
CDSE → flourishing (b)	0.62	0.05	[0.51, 0.73]	.55	< .001
Certainty-oriented career beliefs → flourishing (c'), direct effect	0.09	0.05	[-0.001, 0.18]	.07	.054
Indirect effect (a × b)	0.28	0.04	[0.21, 0.35]	.23	< .001
Total effect (c)	0.37	0.06	[0.26, 0.48]	.30	< .001
<i>Panel B. Competing structural model fit</i>					
Model	χ^2	<i>df</i>	<i>CFI</i>	<i>RMSEA</i>	<i>SRMR</i>
Hypothesized (predominant mediation)	828.42	317	.955	.044	.053
Model A (reversed direction)	828.42	317	.955	.044	.053
Model B (direct effects only)	1029.26	318	.937	.052	.125

Note. $N = 1,115$. Fit indices are based on MLR estimation; 95% CIs were obtained from 5,000 bias-corrected bootstrap draws using ML estimation. B = unstandardized coefficient; β = standardized coefficient; CI = confidence interval. The χ^2 values are scaled. In Panel A, the direct path (c') was nonsignificant, indicating predominant rather than full mediation. In Panel B, Model A and the hypothesized model are statistically equivalent (i.e., they have identical fit).

These models were thus statistically equivalent models that could not be distinguished by fit alone. In other words, the data cannot statistically distinguish between these two directions of association. The hypothesized direction was retained on theoretical grounds, as flourishing is treated as the distal outcome within the Life Design and SCCT frameworks (see Limitations).

Nonlinear Effects

An exploratory analysis examined whether certainty-oriented career beliefs were nonlinearly associated with CDSE and flourishing. At the composite level, adding a quadratic term significantly increased explained variance for CDSE, $b = 0.14$, $SE = 0.03$, 95% CI [0.08, 0.20], $\Delta R^2 = .017$, $\Delta F(1, 1112) = 21.77$, $p < .001$, $f^2 = .02$. Adding a quadratic term also significantly increased explained variance for flourishing, $b = 0.16$, $SE = 0.03$, 95% CI [0.10, 0.21], $\Delta R^2 = .026$, $\Delta F(1, 1112) = 31.36$, $p < .001$, $f^2 = .03$. Both effects were small according to Cohen's (1988) benchmarks. The quadratic effects were confirmed at the latent level using a double-mean-centered product-indicator specification (Lin et al., 2010; Marsh et al., 2004). Because latent quadratic estimates can

depend on how product indicators are formed, four indicator-construction strategies were compared. The disjoint-pairs specification was retained as the best-fitting admissible solution. The quadratic effects were positive and significant for CDSE ($\beta = .12, p = .036$) and flourishing ($\beta = .16, p = .012$). The corresponding models had acceptable fit, with CFI values of .967 and .944, respectively. The quadratic effect was positive and significant across all admissible specifications ($\beta = .12-.27$), indicating that the nonlinearity was not an artifact of indicator construction. The positive quadratic coefficients indicate U-shaped associations, with CDSE and flourishing higher at lower and higher levels of certainty-oriented career beliefs than at moderate levels.

Discussion

This study validated the BLDM and examined the hypothesized indirect association between certainty-oriented career beliefs and student flourishing through CDSE. The three measures demonstrated sound psychometric properties. Certainty-oriented career beliefs were positively associated with CDSE, which was in turn positively associated with flourishing, whereas the direct association between certainty-oriented beliefs and flourishing was not statistically significant after CDSE was included in the model. These findings are consistent with an indirect pathway linking certainty-oriented career beliefs to flourishing through CDSE and provide a baseline account of how the three constructs are related in a Singaporean polytechnic context before exposure to an intervention.

Certainty-Oriented Career Beliefs and CDSE

Although Life Design frameworks often treat early certainty as maladaptive in volatile labor markets (Hofmann et al., 2012; Savickas et al., 2009), the present findings reveal a more nuanced pattern, in which certainty-oriented beliefs were positively associated with CDSE. The direction of this association differs from that

of the negative association reported in the scale's original sample (Oishi, 2012; $r = -.32, p < .001, N = 176$). Because that estimate is an observed correlation while the present association was estimated at the latent level ($\phi = .41$), the comparison is directional rather than metrically equivalent; the two constructs nonetheless remained empirically distinguishable in the present data (see Measurement Model and Psychometric Properties). The contrast might instead reflect cross-cultural non-equivalence in how the items function, consistent with concerns that Western-derived career constructs may not be conceptualized in the same way across systems with different social, cultural, and economic contexts (McMahon & Abkhezr, 2025). The positive association is also theoretically consistent with identity development research suggesting that early commitment can confer psychological stability and confidence in highly structured educational contexts (Kroger & Marcia, 2011). Because Oishi's (2012) negative association was reported more than a decade ago in a different national and labor-market context, it is presented as the scale's originating benchmark rather than as a contemporary comparison.

In Singapore's high-stakes, achievement-driven system, certainty-oriented beliefs may function as a stabilizing cognitive scaffold rather than a constraint at baseline. The present findings are consistent with the relabeling of this construct as certainty-oriented rather than dysfunctional, a decision grounded in the item content rather than in the observed associations (see Measures). Importantly, these beliefs were indirectly associated with flourishing through self-efficacy, indicating their role as a supportive rather than direct resource.

Additionally, the quadratic analysis revealed a U-shaped association, in which CDSE and flourishing were higher at lower and higher levels of certainty-oriented career beliefs than at moderate levels. Rather than declining at higher levels of certainty-oriented career beliefs, flourishing was somewhat higher among

students holding stronger certainty-oriented beliefs. One plausible interpretation is that, in this context, a clear sense of career direction serves as a stabilizing resource, whereas comfort with remaining open to exploration serves a similar role at the other extreme; students at moderate levels may experience the disadvantages of having neither a settled direction nor openness to exploration. Given the small effect sizes ($f^2 = .02$ and $.03$), this interpretation is tentative and warrants longitudinal replication.

Distinguishing Sources of CDSE

The distinction between outcome-based self-efficacy and process-based self-efficacy provides a useful lens for interpreting these findings. Outcome-based self-efficacy arises from having a clear plan, a defined pathway, or a sense of early certainty. In contrast, process-based self-efficacy reflects a belief in one's capacity to explore, adapt, and respond effectively to uncertainty (Bandura, 1997; Lent et al., 1994). At baseline, students may experience relatively high levels of flourishing when self-efficacy is anchored in certainty and clarity, even if that self-efficacy becomes fragile when conditions shift.

Life Design interventions are not designed simply to increase CDSE but to shift its source from reliance on fixed outcomes to iterative action, experimentation, and exploration. The present study establishes an important baseline distinction: CDSE itself was positively associated with flourishing, whereas the beliefs associated with self-efficacy may differ in how they relate to outcomes over time, a possibility that the present design cannot test. By empirically demonstrating that certainty-oriented beliefs were positively associated with CDSE at baseline, this study provides a necessary reference point for interpreting future intervention effects. Specifically, gains in CDSE following Life Design programming should be understood not only in terms of magnitude but

in terms of whether self-efficacy becomes less dependent on certainty and more process-based.

Cultural Context and the Function of Certainty

A polytechnic in Singapore provides a particularly informative setting for examining these dynamics. Singapore's education system is characterized by high academic stakes and a societal emphasis on early career clarity and achievement (Chan & Ng, 2025). Within this context, certainty-oriented beliefs may be socially reinforced and societally rewarded, which may account for their positive association with CDSE in this sample. The present findings suggest that these beliefs are not necessarily dysfunctional at baseline but rather contextually situated cognitive strategies that are associated with CDSE and flourishing within structured environments.

This contextual interpretation indicates the importance of understanding career development constructs from a broader, systemic perspective. Prior research indicates that individuals from different cultural backgrounds perceive career opportunities and barriers differently (Fouad & Byars-Winston, 2005) and that social, political, and economic contexts shape how career adaptability and resilience are understood (McMahon & Abkhezr, 2025). A direct precedent exists in this context: testing Lent's (2004) well-being model with Singaporean and Taiwanese students, Sheu et al. (2014) found satisfactory model fit in both samples, although several structural paths differed significantly between them, indicating that a shared model structure can accommodate culturally distinct mechanisms. Rather than assuming that Western-derived models of career adaptability generalize across contexts, the present study demonstrates the value of empirically testing how foundational constructs function before an intervention. Doing so allows educators and researchers to distinguish between beliefs that support short-term psychological stability and those that foster

long-term flexibility in career decision-making. Further research should examine the contextual and cultural factors that may moderate the function of certainty-oriented beliefs in career development.

Implications for Intervention Evaluation

These findings carry important implications for evaluating interventions targeting CDSE and flourishing. First, they highlight the importance of establishing baseline structural relationships before assessing intervention impact. Without such a baseline, increases in CDSE or flourishing could be misinterpreted as unequivocally positive, even if they reflect the reinforcement of outcome-based self-efficacy rather than the development of process-based self-efficacy.

Second, the results suggest that intervention success should not be judged solely by whether CDSE increases but by whether the basis of self-efficacy shifts. Life-Design-informed programming may be particularly effective when it helps students maintain or enhance CDSE while reducing dependence on early certainty and increasing tolerance for exploration, ambiguity, and iterative decision-making (Super, 1980). The validated measures presented here provide a concise, theory-aligned tool for testing such changes in future pre-post and longitudinal studies. For practitioners, these brief measures allow routine monitoring of whether students' confidence is grounded in process-based self-efficacy rather than certainty alone.

Limitations and Future Directions

Several limitations should be noted. The shortened CDSE scale prioritized the process- and exploration-oriented facets central to the Life Design framework; consequently, it does not retain self-appraisal content and represents problem-solving through a single indicator, which may constrain the breadth of the construct as measured.

The shortened flourishing battery employed two indicators per PERMAH facet, which precluded stable estimation of facet-level reliability and yielded high interfactor correlations (up to $R-M = .93$). Comparable, though smaller, facet correlations are reported in the PERMA-Profiler validation itself (e.g., meaning-accomplishment = .91; Butler & Kern, 2016), indicating that this pattern reflects overlap among the instrument's domains rather than a study-specific artifact. Flourishing was therefore modeled as a general flourishing factor rather than as separable facets; facet-level inferences should be treated with caution.

A further limitation concerns model equivalence. The hypothesized and reversed-direction models produced identical fit, so the data cannot adjudicate directionality. This equivalence arises because any three-variable chain fits the data identically whether specified in the forward or reverse direction; it is a property of the model's structure rather than a finding about these constructs. SCTT further holds that self-efficacy and the mastery experiences that shape it influence one another reciprocally (Bandura, 1997; Lent et al., 1994), so the present model represents one directional specification of a process that is likely reciprocal over time. Cross-sectional data cannot capture such feedback, and longitudinal designs would be required to model it. Within the social cognitive model of well-being, however, self-efficacy is specified as an antecedent of satisfaction outcomes rather than as their consequence (Lent, 2004), and the hypothesized ordering was retained accordingly.

This study relied on cross-sectional data collected before exposure to the intervention, precluding causal inference and limiting conclusions about developmental change. The sample was drawn from a single polytechnic, and the findings may not generalize to other educational contexts or age groups. The BLDM were administered as self-report measures at a single time point; common method bias cannot be ruled out.

Future studies should build on this baseline using longitudinal and experimental designs, examining how Life Design interventions alter both the level and source of CDSE, whether shifts away from certainty-oriented beliefs predict greater flourishing under conditions of transition, and whether the short-term benefits of certainty introduce longer-term vulnerabilities in dynamic labor markets. Such studies would also allow the stability and sensitivity of the shortened measures to be tested over time. To support applied use, the validated shortened measures are provided in Appendix A.

Conclusion

Certainty-oriented career beliefs are positively associated with CDSE, which in turn is associated with student flourishing, indicating a predominantly indirect pathway. This positive belief–efficacy association differs in direction from the negative association reported in the scale’s original Western sample (Oishi, 2012), suggesting that certainty-oriented beliefs may function differently within this highly structured educational context. These findings underscore the importance of evaluating career interventions not only by whether students’ CDSE increases but also by whether that self-efficacy is grounded in exploration, experimentation, and iterative action rather than early certainty. As young people increasingly navigate uncertain and precarious labor markets, understanding how career beliefs relate to self-efficacy and flourishing is essential for developing culturally responsive career interventions.

References

- Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103(3), 411–423. <https://doi.org/10.1037/0033-2909.103.3.411>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.
- Betz, N. E., & Luzzo, D. A. (1996). Career assessment and the career decision-making self-efficacy scale. *Journal of Career Assessment*, 4(4), 413–428. <https://doi.org/10.1177/106907279600400405>
- Burnett, B., & Evans, D. (2016). *Designing your life: How to build a well-lived, joyful life*. Knopf.
- Butler, J., & Kern, M. L. (2016). The PERMA-Profil: A brief multidimensional measure of flourishing. *International Journal of Wellbeing*, 6(3), 1–48. <https://doi.org/10.5502/ijw.v6i3.526>
- Chan, G., & Ng, W. K. (2025, November 22). Inside Singapore’s education ‘arms race’: Stress, inequality and the push for change. *The Straits Times*. <https://www.straitstimes.com/singapore/inside-singapores-education-arms-race-stress-inequality-and-the-push-for-change>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.
- Davis, D. B., Davies, K. H., Liu, D., & Burnett, W. (2025). The Life Design mindsets: A review of theory and practice for student growth and career readiness. *Innovative Higher Education*, 50(6), 2019–2042. <https://doi.org/10.1007/s10755-025-09854-5>
- De Vos, A., Van der Heijden, B. I. J. M., & Akkermans, J. (2020). Sustainable careers: Towards a conceptual model. *Journal of Vocational Behavior*, 117, Article 103196. <https://doi.org/10.1016/j.jvb.2018.06.011>
- Dosi, C., Rosati, F., & Vignoli, M. (2018). Measuring design thinking mindset. In D. Marjanović, M. Štorga, S. Škec, N. Bojčetić, & N. Pavković (Eds.), *DS 92: Proceedings of the DESIGN 2018 15th International Design Conference* (pp. 1991–2002). Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb; The Design Society. <https://doi.org/10.21278/idc.2018.0493>
- Flora, D. B. (2020). Your coefficient alpha is probably wrong, but which coefficient omega is right? A tutorial on using R to obtain better reliability estimates. *Advances in Methods and Practices in Psychological Science*, 3(4), 484–501. <https://doi.org/10.1177/2515245920951747>
- Fouad, N. A., & Byars-Winston, A. M. (2005). Cultural context of career choice: Meta-analysis of race/ethnicity differences. *The Career Development Quarterly*, 53(3), 223–233. <https://doi.org/10.1002/j.2161-0045.2005.tb00992.x>
- Friedman, H. S., & Kern, M. L. (2014). Personality, well-being, and health. *Annual Review of Psychology*, 65, 719–742. <https://doi.org/10.1146/annurev-psych-010213-115123>
- Galesic, M., & Bosnjak, M. (2009). Effects of questionnaire length on participation and indicators of response quality in a web survey. *Public Opinion Quarterly*, 73(2), 349–360. <https://doi.org/10.1093/poq/nfp031>
- Hofmann, S. G., Asnaani, A., Vonk, I. J. J., Sawyer, A. T., & Fang, A. (2012). The efficacy of cognitive behavioral

- therapy: A review of meta-analyses. *Cognitive Therapy and Research*, 36(5), 427–440. <https://doi.org/10.1007/s10608-012-9476-1>
- Kline, R. B. (2023). *Principles and practice of structural equation modeling* (5th ed.). Guilford Press.
- Kroger, J., & Marcia, J. E. (2011). The identity statuses: Origins, meanings, and interpretations. In S. J. Schwartz, K. Luyckx, & V. L. Vignoles (Eds.), *Handbook of identity theory and research* (pp. 31–53). Springer. https://doi.org/10.1007/978-1-4419-7988-9_2
- Krumboltz, J. D. (1994). The Career Beliefs Inventory. *Journal of Counseling & Development*, 72(4), 424–428. <https://doi.org/10.1002/j.1556-6676.1994.tb00962.x>
- Kruyen, P. M., Emons, W. H. M., & Sijtsma, K. (2013). On the shortcomings of shortened tests: A literature review. *International Journal of Testing*, 13(3), 223–248. <https://doi.org/10.1080/15305058.2012.703734>
- Lent, R. W. (2004). Toward a unifying theoretical and practical perspective on well-being and psychosocial adjustment. *Journal of Counseling Psychology*, 51(4), 482–509. <https://doi.org/10.1037/0022-0167.51.4.482>
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, 45(1), 79–122. <https://doi.org/10.1006/jvbe.1994.1027>
- Lin, G.-C., Wen, Z., Marsh, H. W., & Lin, H.-S. (2010). Structural equation models of latent interactions: Clarification of orthogonalizing and double-mean-centering strategies. *Structural Equation Modeling: A Multidisciplinary Journal*, 17(3), 374–391. <https://doi.org/10.1080/10705511.2010.488999>
- Lord, R. G., & Maher, K. J. (1990). Alternative information-processing models and their implications for theory, research, and practice. *Academy of Management Review*, 15(1), 9–28. <https://doi.org/10.5465/amr.1990.4308219>
- Marsh, H. W., Wen, Z., & Hau, K.-T. (2004). Structural equation models of latent interactions: Evaluation of alternative estimation strategies and indicator construction. *Psychological Methods*, 9(3), 275–300. <https://doi.org/10.1037/1082-989X.9.3.275>
- McMahon, M., & Abkhezr, P. (2025). Career adaptability and career resilience: A systems perspective. *International Journal for Educational and Vocational Guidance*. Advance online publication. <https://doi.org/10.1007/s10775-025-09739-1>
- Mohd Rasdi, R., & Ahrari, S. (2020). The applicability of social cognitive career theory in predicting life satisfaction of university students: A meta-analytic path analysis. *PLOS ONE*, 15(8), Article e0237838. <https://doi.org/10.1371/journal.pone.0237838>
- Norrish, J. M. (2015). *Positive education: The Geelong Grammar School journey*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198702580.001.0001>
- OECD. (2025). *Education for human flourishing: A conceptual framework*. <https://doi.org/10.1787/73d7cb96-en>
- Oishi, L. N. (2012). *Enhancing career development agency in emerging adulthood: An intervention using design thinking* [Doctoral dissertation, Stanford University]. Stanford Digital Repository. <https://purl.stanford.edu/tt351qn0806>
- Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48(2), 1–36. <https://doi.org/10.18637/jss.v048.i02>
- Savickas, M. L., Nota, L., Rossier, J., Dauwalder, J.-P., Duarte, M. E., Guichard, J., Soresi, S., Van Esbroeck, R., & van Vianen, A. E. M. (2009). Life designing: A paradigm for career construction in the 21st century. *Journal of Vocational Behavior*, 75(3), 239–250. <https://doi.org/10.1016/j.jvb.2009.04.004>
- Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. Free Press.
- Sheu, H.-B., Chong, S. S., Chen, H.-F., & Lin, W.-C. (2014). Well-being of Taiwanese and Singaporean college students: Cross-cultural validity of a modified social cognitive model. *Journal of Counseling Psychology*, 61(3), 447–460. <https://doi.org/10.1037/cou0000018>
- Super, D. E. (1980). A life-span, life-space approach to career development. *Journal of Vocational Behavior*, 16(3), 282–298. [https://doi.org/10.1016/0001-8791\(80\)90056-1](https://doi.org/10.1016/0001-8791(80)90056-1)
- World Economic Forum. (2025). *AI in action: Beyond experimentation to transform industry* [White paper]. https://reports.weforum.org/docs/WEF_AI_in_Action_Beyond_Experimentation_to_Transform_Industry_2025.pdf

Appendix A

BLDM

This appendix presents the full item wording for the BLDM, comprising scales assessing certainty-oriented career beliefs, CDSE, and flourishing.

A. Certainty-Oriented Career Beliefs Scale (six items)

Label	Indicate your level of agreement with each statement below using a five-point Likert scale (1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree)
A1	Graduates should know what they want to do with their lives.
A2	It is important that I make a serious, long-term decision about my career.
A3	If I make a mistake in choosing an occupation, it will have serious long-term consequences.
A4	If I make a good decision now, I will not have to change my career later in life.
A5	I should be sure of my professional plans and goals before I do anything.
A6	My career will be determined by the choices I make now.

B. CDSE Scale (nine items)

Label	How sure (confident) are you that you could ...
	1 = Very unsure; 2 = Unsure; 3 = Neutral; 4 = Sure; 5 = Very sure
B1	Identify multiple career paths that are practical for you, given your experience and education to date.
B2	Identify, connect, and meet up with someone who is already employed in a field you are interested in.
B3	Identify employers, organizations, and training institutions relevant to your career plans.
B4	Choose a job to try based on a list of potential occupations you are considering.
B5	Choose a career that will fit your interests.
B6	Decide on the steps to take if you are having challenges with your career planning and exploration.
B7	Identify several jobs that you are interested in actively exploring.
B8	Make a plan for exploring your career over the next five years.
B9	Identify alternative plans if you are unable to get your desired job roles

C. Flourishing Scale (13 items)

Label	PERMAH code	Please read each of the following questions and then select the point on the scale (see right column) that you feel best describes you.
C1	A1	How much of the time do you feel you are making progress toward accomplishing your goals?
		1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Always

C2	E1	How often do you become absorbed in what you are doing?	Same as above
C3	P1	In general, how often do you feel joyful?	Same as above
C4	A2	How often do you achieve the important goals you have set for yourself?	Same as above
C5	P2	In general, how often do you feel positive?	Same as above 1 = Not at all; 2 = Slightly; 3 = Moderately; 4 = Mostly; 5 = Completely
C6	M1	In general, to what extent do you lead a purposeful and meaningful life?	Same as above
C7	R1	To what extent do you receive help and support from others when you need it?	Same as above
C8	M2	In general, to what extent do you feel that what you do in your life is valuable and worthwhile?	Same as above
C9	E2	In general, to what extent do you feel excited and interested in things?	Same as above
C10	R2	To what extent do you feel loved?	Same as above
C11	hap	Taking all things together, how happy would you say you are?	Same as above 1 = Terrible; 2 = Poor; 3 = Fair; 4 = Good; 5 = Excellent
C12	H1	In general, how would you say your health is?	Same as above
C13	H3	Compared to others of your age and sex, how is your health?	Same as above

Note. C11 (global happiness) was administered but excluded from the latent flourishing factor and modeled as a standalone index rather than as a facet-level indicator within the PERMA scale (Butler & Kern, 2016).