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Individual preferences in multiple goal pursuit: Reconsidering the conceptualization and dimensionality of polychronicity

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Abstract

With increasing demands in work and life, successful self-regulation of multiple goals becomes critical to the well-being and performance of individuals and organizations. When pursuing multiple goals, individuals may use different strategies and have divergent preferences toward these strategies. Polychronicity, or the preference for multitasking over sequential tasking, has long been considered a unidimensional construct with two opposing ends. To empirically test this assumption, we reconstructed existing polychronicity items to explore a new scale that measures preferences separately and synthesizes different operationalizations of multitasking (i.e., concurrent tasking and task switching) (study 1). We found that multitasking and sequential preferences, while related, have distinct components and can co-occur within individuals, challenging the traditional bipolar assumption (study 2). Finally, we used a behavioral task-switching paradigm to simulate a multitasking environment. We found that consistent with past research, the preferences were not associated with behavioral performance but were associated with subjective experience (study 3). Our findings suggest that assuming multitasking and sequential

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preferences are completely antithetical can be an oversimplification. This research opens opportunities for future research on multiple goals.

KEYWORDS

continuum specification, multiple goals, multitasking, polychronicity, self-regulation

INTRODUCTION

Juggling multiple goals (tasks, activities, etc.) is an experience relatable to many people in work and life (e.g., Emmons & King, 1988). Not surprisingly, the study of multiple goal pursuits has become an important topic in the applied psychology literature (e.g., Ballard et al., 2016; Kung & Scholer, 2020; Unsworth et al., 2014). Research suggests that success in regulating multiple conflicting goals bears non-trivial consequences for well-being and performance (e.g., Gray et al., 2017; Kehr, 2003; Locke et al., 1994), and people vary in the way they pursue multiple goals: two main strategies are multitasking and sequential strategies (e.g., Kung & Scholer, 2020; Orehek & Vazeou-Nieuwenhuis, 2013). Accordingly, one individual difference construct that has been studied is *polychronicity*, generally defined as the preference for pursuing multiple goals simultaneously or shifting attention among them (i.e., preference for a multitasking strategy), as opposed to the preference for doing one thing at a time (i.e., preference for a sequential strategy, a.k.a. *monochronicity*¹) (e.g., Bluedorn et al., 1992; Poposki & Oswald, 2010).

This concept of polychronicity has inspired many studies in applied psychology—from restaurant servers (Kapadia & Melwani, 2021) to knowledge workers (Suija-Markova et al., 2020), job performance is determined partly by how well they manage simultaneous goals. Polychronicity has become even more relevant since the COVID-19 pandemic, for it has increased opportunities and challenges of multitasking in remote work contexts (Cao et al., 2021; Leroy et al., 2021). As research suggests, polychronicity predicts important work and non-work outcomes. For instance, polychronicity is associated with more positive well-being and affective outcomes when the work environment requires multitasking (Hecht & Allen, 2005; Poposki & Oswald, 2010). It is also associated with using the integrating strategy in conflict resolution (Tinsley, 1998) and negotiation (Tinsley, 2001). Findings on the relation between polychronicity and individual performance have been mixed, depending on the study context and measure (Conte & Jacobs, 2003; Grawitch & Barber, 2013; Sanderson et al., 2013). For instance, CEO's polychronicity interacts with environmental factors to predict firm innovation (Chen, 2020). Regardless, polychronicity clearly has important implications for work and applied settings.

Despite this growing literature, the current conceptualization and measurement of polychronicity have limitations. Across the existing measures of polychronicity (Bluedorn et al., 1999; Kaufman et al., 1991; Lindquist & Kaufman-Scarborough, 2007; Poposki & Oswald, 2010; Slocombe & Bluedorn, 1999), there is an assumption that preferences for multitasking and sequential strategies are antithetical (i.e., represent two opposite ends of one spectrum). However, this assumption has yet to be examined, partly due to methodological issues. The current research makes an important contribution by empirically testing this assumption (i.e., continuum specification). In addition, across existing scales, what is

considered “multitasking” is not consistent, which might further prevent differentiating or integrating meaningful dimensions in multiple goal pursuit (see Howard & Cogswell, 2022). Our research contributes to the understanding of polychronicity by synthesizing different operationalizations of multitasking. Below, we elaborate on these two issues and the importance of addressing them.

Continuum specification of multitasking and sequential preferences

The issue of continuum specification (Tay & Jebb, 2018) involves examining whether it is appropriate to assume, and whether there is enough evidence to justify, that preference for multitasking (polychronicity) and preference for sequential pursuit (monochronicity) are opposite ends of a continuum spectrum. In the polychronicity literature, the two preferences have been assumed to be antithetical; researchers place them within a single overarching construct and assume they are opposite in measurements. However, we suggest this assumption needs to be carefully examined with empirical evidence. It is not unusual that widely used constructs later need to be scrutinized in terms of continuum specification. For example, while early studies on regulatory focus theory assumed promotion focus and prevention focus were two ends of one spectrum (e.g., Avnet & Higgins, 2006; Lockwood et al., 2002; Louro et al., 2005; Zhao & Pechmann, 2007), more recent empirical work found that they were better considered as separate dimensions (Gorman et al., 2012; Haws et al., 2010). In the context of polychronicity, next we will illustrate how existing scales measure multitasking and sequential preferences as opposites and why an alternative is also possible.

Existing measurement practices

Due to the assumption in the literature that preferences for multitasking and sequential strategies are opposite ends of the polychronicity spectrum, several practices arise when operationalizing the construct in scale items. First, most scales use monochronicity items as reverse-coded items (e.g., “I like to finish one task completely before focusing on anything else.”; Poposki & Oswald, 2010). In those cases, a high polychronicity score would mean that the individual enjoys multitasking *and* dislikes sequential tasking, which excludes other combinations of the preferences. Using items of sequential preference (monochronicity) as reverse-coded items could contaminate measurement if polychronicity and monochronicity are two different continua. Second, some scales compare the two preferences in a single item² (e.g., “I would *rather* complete parts of several projects every day *than* complete an entire project”; Bluedorn et al., 1999). These items are problematic if researchers want to measure the intensities of multitasking and sequential preferences because low scores on those items can imply no relative preference. That is, those who have similar preferences for multitasking and sequential pursuit would disagree with these items and thus have low scores, regardless of their high or low preference for both. The simultaneous inclusion of both reverse-coded items and items that contradict the two preferences would make the measured construct more unclear. Third, some scales (e.g., Lindquist & Kaufman-Scarborough, 2007) only include items that measure preference for multitasking and explicitly assume that a low score represents a preference for sequential tasking without actually measuring that, which prevents researchers from empirically testing the relationship between polychronicity and monochronicity.

The aforementioned methodological aspects of existing scales have limited researchers' ability to obtain sufficient empirical evidence to specify the continuum of polychronicity because they inherently assume multitasking preference and sequential preference are antithetical. Therefore, the existing measures are valid only if this assumption is true, which unfortunately cannot be appropriately tested by the existing polychronicity scales.

An alternative possibility

Besides the issues in existing measurement practices, one might wonder why we should even reconsider the continuum of polychronicity. Is it even possible that multitasking and sequential preferences are not mutually exclusive?

First, if multitasking and sequential preferences are two differentiable constructs, they should show unique components in their variances and relations with other variables. It is theoretically possible because multitasking and sequential tasking involve different cognitive processes and abilities. Multitasking (both task switching and dual-tasking) requires cognitive flexibility to adapt mental processes in different situations and tasks (Koch et al., 2018). In contrast, sequential tasking relies on cognitive stability associated with temporarily shielding the mind from distracting goals to focus on a current goal (Orehek & Vazeou-Nieuwenhuis, 2013). Despite the longstanding yet under-tested assumption in cognitive psychology that there is an inherent trade-off between flexibility and stability, recent research suggests that the cognitive processes underlying the two functions can be independently regulated (Geddert & Egner, 2022). This initial evidence suggests that multitasking and sequential tasking may be two unique strategies that are worth separate consideration in polychronicity.

Second, continuum specification research suggests that it should be hard to find people scoring high on measures of two opposite ends of one bipolar continuum (Tay & Kuykendall, 2017). If multitasking and sequential tasking are not completely opposite, it should be possible for some people to have high preferences for the two strategies simultaneously. Just as individuals can be cognitively flexible and stable simultaneously (Geddert & Egner, 2022), some people might enjoy both multitasking and sequential strategies. It might be especially possible considering how people manage more than two goals (Kung & Scholer, 2021). Depending on how people construe and organize multiple goals, some might have a positive attitude toward using two strategies simultaneously. Imagine chefs whose overall job is preparing meals with multiple vegetarian options and multiple meat options. Chef A might like to do everything at once regardless of the dish (high only on multitasking preference). Chef B might tend to finish one dish before starting the next one (high only on sequential preference). In contrast, Chef C might prefer to prepare vegetarian and meat dishes sequentially but multitask when preparing dishes within each category (e.g., preparing all salads concurrently). Thus, Chef C may be high on sequential preference (wanting different categories of food prepared sequentially) while also being high on multitasking preference (wanting all food within a category prepared concurrently).³ Such positive attitudes toward two different strategies might result from incorporating different norms and contextual demands into one's preference, considering the important role of the environment according to the normative-contextual model of attitude (Riemer et al., 2014), or they might reflect individual differences in using different strategies flexibly in self-regulation (Bonanno & Burton, 2013).

Although there is indirect evidence showing that it is possible to consider multitasking preference and sequential preference as two related yet conceptually distinguishable dimensions, we want to make some clarifications. First, this alternative perspective does not suggest that preferences for the two strategies must be completely independent or uncorrelated. Instead, they may be two related constructs with overlapping but also unique variances and nomological networks. This research aims not to separate the two preferences as unrelated constructs but to scrutinize the existing bipolar assumption. This inquiry probes the potential for more nuanced, multidimensional facets within what has traditionally been viewed as a singular continuum. Second, although the two preferences might have unique antecedents and outcomes and some people might show high preferences for both strategies, it is beyond the scope of the current research to develop and test a theoretical explanation of that. However, we consider it an important contribution to explore this open-ended research question and empirically uncover related phenomena. We plan to make this first step in reconsidering the conceptualization of polychronicity and to open new theoretical opportunities and questions for future research.

Synthesis of different operationalizations of multitasking

In addition to the main contribution of continuum specification, our research also contributes to the polychronicity literature by synthesizing different operationalizations of multitasking, directly responding to a recent call for such work (Howard & Cogswell, 2022). On the behavioral level, research suggests there are two major forms of multitasking: dual-tasking or concurrent tasking refers to performing multiple activities simultaneously, while task switching refers to performing multiple activities in succession (Howard & Cogswell, 2022). Task switching sometimes is also referred to as “sequential multitasking,” especially when participants switch back and forth between two tasks rapidly instead of performing them simultaneously (Koch & Kiesel, 2022). However, in the current work, we use the term “sequential” as attending exclusively to one task (or iterations of the same task) from start to finish before focusing on another task (e.g., Howard & Cogswell, 2022), in contrast to multitasking (including both concurrent tasking and task switching). This terminology is consistent with research on multiple goal pursuit and multitasking, both on the strategy level (e.g., Orehek & Vazeou-Nieuwenhuis, 2013) and behavioral level (e.g., Szumowska & Kruglanski, 2022). Although concurrent tasking and task switching may appear similar, especially when the switch rate is high, the psychological processes involved can differ. Research shows that behavioral concurrent tasking (or dual-tasking) and task switching have been studied in separate paradigms with different theoretical foci (Koch et al., 2018; Pashler et al., 2000). A recent meta-analytic review found that dual-tasking and task switching have common neural bases on top of their unique components (Worringer et al., 2019), indicating that they might be conceptualized as two closely related forms of multitasking (Kung & Scholer, 2020). Overall, research suggests that both concurrent and task-switching forms are valid and relevant forms of multitasking.

In parallel with the behavioral level, on the preference level, research on polychronicity or multitasking preference has operationalized multitasking as both concurrent tasking (e.g., “to do two or more activities at the same time”; Lindquist & Kaufman-Scarborough, 2007) and task switching (e.g., “switch back and forth between several projects than concentrate my efforts on just one”; Poposki & Oswald, 2010) in scale items. Notably, a meta-analysis of polychronicity

pointed out that most research on polychronicity defined multitasking as task switching, and no single scale has included both concurrent tasking and task switching despite both being important forms of multitasking (Howard & Cogswell, 2022). The authors called for “a bidimensional polychronicity measure that assesses preferences for both task-switching and dual-tasking” and suggested that “such a measure would more closely adhere to current understandings of multitasking, and it could differentiate people that may have a preference for one type of multitasking but not the other” (Howard & Cogswell, 2022). In line with this call, we measure preferences for both forms of multitasking. By doing so, we not only can be more comprehensive in capturing the conceptual space of multitasking preference but also can test relationships between concurrent/task-switching preference and sequential preference.

Overview of current research

To our knowledge, no study thus far has holistically studied the interrelations among concurrent, switching, and sequential preferences, and there needs to be more continuum specification of polychronicity. Addressing these issues requires a scale that allows us to measure the preferences separately (as distinguishable concepts) and appropriately (with more precise items that do not conflate multiple concepts). Therefore, in the present research, we reconstructed existing polychronicity items to develop a new scale that measures preferences separately and synthesizes different operationalizations of multitasking (studies 1 and 2). With this improved tool, we sought to examine whether multitasking and sequential preferences are opposite ends of one continuum or two distinguishable constructs. We also explored their relations with other individual differences (study 2) and people's performance and subjective experience in a behavioral multitasking paradigm (study 3). Across the studies, evidence from different perspectives (factor analyses, bivariate plots, and correlations with other constructs) helped us gain more nuanced insights into the construct continuum of polychronicity. All data and analysis codes are available at: <https://bit.ly/3xDmg8X>. The scale items we developed are included in the Appendix.

STUDY 1: RECONSTRUCTION OF POLYCHRONICITY ITEMS AND EXAMINATION OF DIMENSIONALITY

To empirically test the interrelations among the three potential preferences, we needed non-contaminated scale items that could capture the preferences independently. To this end, we reconstructed existing items from published scales of polychronicity or multitasking preference in the following way. First, we conducted a literature review and identified the four existing scales of polychronicity (Bluedorn et al., 1999; Kaufman et al., 1991; Lindquist & Kaufman-Scarborough, 2007; Poposki & Oswald, 2010). Second, whenever an existing item conflated more than one of the three preferences, we reconstructed or broke down the item so that each revised item focused on only one specific preference. To provide a conceptually cleaner version of a multitasking preferences scale, we selected items only related to preferences and not to other components (e.g., beliefs), in line with theoretical suggestions (König & Waller, 2010) and empirical practice (Poposki & Oswald, 2010). Third, to balance the initial number of items for each preference, we also created a couple of items based on their

definitions. Overall, this procedure resulted in 21 items—seven items for each of the three preferences (concurrent, switching, and sequential).

Method

Participants

Using Amazon's Mturk, we recruited 302 adults in the United States to participate in a survey; 277 passed the attention-check question (e.g., “please choose three as a response to this item”; Kung et al., 2018) and were included in the analyses (135 females, 141 males; $M_{\text{age}} = 35.5$ years, $SD_{\text{age}} = 11.2$ years; 72.9% White).

Measures

Participants finished a scale of 21 items (see Appendix) measuring their three preferences (seven items for each): concurrent preference (e.g., “I like to pursue several tasks or goals at the same time”), switching preference (e.g., “I like to shift my attention between multiple goals”), and sequential preference (e.g., “I like to achieve an entire goal at a time”). Participants rated the items on a seven-point Likert scale (from “1 = strongly disagree” to “7 = strongly agree”).

Analyses

To determine the factor structure of the scale items, we conducted an exploratory factor analysis (EFA; Hinkin, 1998). Because the preferences were theoretically expected to correlate with each other, we used the oblique (oblimin) rotation method (Hinkin, 1998). Principal axis method was used for extraction and maximum likelihood method generated the same factor solution. To determine the number of factors, we used parallel analysis (Horn, 1965). Kaiser-Guttman Rule (eigenvalue greater than one; Guttman, 1954; Kaiser, 1960) and scree plot (Cattell, 1966) suggested the same factor solution.

Results

EFA resulted in a two-factor solution for the items. Items of concurrent preference and switching preference emerged as one factor (i.e., multitasking preference). Items of sequential preference emerged as the other factor. The two factors were negatively correlated ($r = -.63$) and explained 72.80% of the variance. The eigenvalue for the two factors was 2.12.⁴ All of the factor loadings for both factors were larger than 0.77. To shorten the scale and balance the number of items in each factor, we selected seven items with the highest factor loadings in the multitasking preference factor (including four for concurrent and three for switching) and maintained the seven items for the sequential factor. EFA based on these 14 items still produced a two-factor solution. The two factors were negatively correlated ($r = -.63$). Cronbach's α for each subscale was very high (multitasking: .96; sequential: .94).

STUDY 2: REPLICATION OF DIMENSIONALITY AND RELATIONS WITH OTHER CONSTRUCTS

In study 1, we developed a new scale for measuring individual differences in multitasking preferences and provided evidence that multitasking preference and sequential preference were negatively related but conceptually distinguishable constructs. This suggests that we might need to revisit the assumption in the literature that they are the opposite ends of one continuum. In study 2, we examined the factor structure in two new samples using confirmatory factor analysis (CFA), aiming to replicate the relationship between multitasking preference and sequential preference.

In addition, we constructed bivariate plots and calculated the proportion of participants who scored high on both preferences. In previous measures of polychronicity, individuals with a high preference for multitasking were assumed to have a low preference for sequential tasking. This assumption is in line with the bipolarity measurement model, where mutual exclusion between two constructs is required when individuals have high endorsement (Tay & Kuykendall, 2017). If we find that participants could score high on both multitasking and sequential preferences, it would provide additional support for the notion that they are not necessarily opposite of each other.

Moreover, we tested the relations between the current scale and other theoretically or empirically related constructs in three ways to provide initial validity evidence for the current scale and to explore whether the pure measures of multitasking and sequential preferences would correlate differently with other constructs. First, whereas the current scale measures multitasking preference and sequential preference separately, some of the previous scales include items that make direct contradictions between these two preferences in single items (Bluedorn et al., 1999; Poposki & Oswald, 2010). To differentiate those items from the “pure” preferences that the current scale measures, we refer to what those items measure as “relative polychronicity” because they reflect one’s relative preference for multitasking *over* sequential tasking. Theoretically, multitasking preference and sequential preference measured by the current scale should be correlated with relative polychronicity positively and negatively, respectively. The correlations should be at moderate-to-high levels due to the direct conceptual overlap. To test this hypothesis, we identified and included five items of relative polychronicity from previous scales (Bluedorn et al., 1999; Poposki & Oswald, 2010).

Second, we measured goal orientations, which refer to individual differences in dispositions towards developing and demonstrating ability during goal pursuit (Dweck, 1986). Research has consistently shown the existence and unique roles of three different goal orientations (Vandewalle, 1997): (1) learning goal orientation (LGO): “a desire to develop the self by acquiring new skills, mastering new situations, and improving one’s competence”; (2) performance-prove goal orientation (PPGO): “the desire to prove one’s competence and to gain favorable judgments about it”; (3) performance-avoid goal orientation (PAGO): “the desire to avoid the disproving of one’s competence and to avoid negative judgments about it.” Past researchers argued that multitasking not only provided more opportunities for learning and growth (favoring learning goals) but also increased task complexity and the chance of failure (adverse to performance-avoid goals) (Schell & Conte, 2008). Therefore, they predicted and found that polychronicity measured by the scale developed by Bluedorn et al. (1999) was correlated positively with LGO and negatively with PAGO. Because that measure of polychronicity assumed multitasking preference and sequential preference are opposite ends of one continuum, the findings would suggest that sequential preference is negatively related to LGO and positively related to

PAGO. However, it is possible that the two preferences distinctly correlate with different goal orientations. We tested this possibility using the current pure measures of multitasking and sequential preferences.

Third, past research examining the relationship between polychronicity and performance has shown inconsistent findings (König & Waller, 2010). We tested whether multitasking and sequential preferences measured by the current scale would be differently related to individuals' performance (i.e., self-evaluations of work and academic performance, undergraduates' grade point average).

Method

Participants and procedure

To increase the generalizability of the findings, we recruited two independent samples from different sources. Sample A consisted of adults in the United States from Amazon's Mturk. Initially, 200 people participated; 176 passed attention-check questions (e.g., "please choose three as a response to this item"; Kung et al., 2018) and were included in the final analyses (70 females, 106 males; $M_{\text{age}} = 35.3$ years, $SD_{\text{age}} = 11.4$ years; 73.3% White). Sample B consisted of undergraduate students at a Midwestern public university in the United States, who participated for credits in an introductory psychology course. Initially, 474 people participated; 43 failed attention-check questions or were younger than 18 years old and were excluded from the analyses, resulting in 431 individuals in the final sample (233 females, 197 males; $M_{\text{age}} = 18.9$ years, $SD_{\text{age}} = 1.07$ years; 76.8% White). Both samples finished a survey that included the current measure of multitasking and sequential preferences and other relevant scales.

Measures

Multitasking and sequential preferences were measured using the 14-item scale developed in study 1. Seven items measured multitasking preference (e.g., "I like to pursue several tasks or goals at the same time"; sample A: Cronbach's $\alpha = .95$; sample B: Cronbach's $\alpha = .89$). Seven items measured sequential preference (e.g., "I like to achieve an entire goal at a time"; sample A: Cronbach's $\alpha = .95$; sample B: Cronbach's $\alpha = .91$). Participants rated the items on a seven-point Likert scale (from "1 = strongly disagree" to "7 = strongly agree").

Relative polychronicity was measured by five items from previous scales of polychronicity that make direct contradictions between the two preferences in single items (Bluedorn et al., 1999; Poposki & Oswald, 2010) (e.g., "I prefer to work on several projects in a day, *rather than* completing one project and then switching to another"; Sample A: Cronbach's $\alpha = .92$; Sample B: Cronbach's $\alpha = .86$). Participants rated the items on a seven-point scale (from "1 = strongly disagree" to "7 = strongly agree").

Goal orientations were measured by the work domain goal orientation scale developed and validated by Vandewalle (1997), including *learning goal orientation (LGO)* (four items; e.g., "I often look for opportunities to develop new skills and knowledge"; sample A: Cronbach's $\alpha = .86$; sample B: Cronbach's $\alpha = .85$); *performance-prove goal orientation (PPGO)* (five items; e.g., "I'm concerned with showing that I can perform better than my coworkers"; sample A:

Cronbach's $\alpha = .80$; sample B: Cronbach's $\alpha = .66$); and *performance-avoid goal orientation* (PAGO) (four items; e.g., “Avoiding a show of low ability is more important to me than learning a new skill.”; sample A: Cronbach's $\alpha = .87$; sample B: Cronbach's $\alpha = .81$). Participants rated the items on a 7-point scale (from “1 = not at all” to “7 = to a large extent”).

A one-item question adapted from Cleveland and Shore (1992) was used to measure participants' self-evaluation of work (or academic) *performance*. Participants were asked to use a scale from “0 = consistently way below expectations” to “100 = consistently way exceeding expectations” to rate their subjective work (or academic) performance. For the undergraduate sample (sample B), students were also asked to self-report their grade point average (GPA). Students' self-evaluation of academic performance was positively correlated with their self-reported GPA ($r = .42, p < .001$).

Analyses

CFA was conducted to replicate the factor structure that emerged from EFA and confirm the dimensionality of the scale (Hinkin, 1998). Notably, as multitasking preference and sequential preference are theorized to be either two unipolar constructs or two ends of one bipolar continuum (instead of a combinatorial construct), factor analysis (instead of multidimensional scaling) is suitable for testing dimensionality (Tay & Jebb, 2018). We used several standard criteria to assess the goodness of fit of the two-factor model, including standardized root mean square residual (SRMR) $\leq .08$, root mean square error of approximation (RMSEA) $\leq .06$, and comparative fit index (CFI) $\geq .95$ (Hu & Bentler, 1999; Tabachnick & Fidell, 2007). Because of the high internal consistency of the constructs measured, we calculated the composite score of each variable by averaging the item scores. Bivariate correlations were conducted to examine the relationships between multitasking and sequential preferences and other constructs. We also constructed bivariate plots and calculated the proportion of participants who scored higher than the scale midpoint on both preferences.

Results

CFA

First, we tested the fit of the two-factor model from study 1 for both samples. Table 1 shows that the model fit in sample A was good for two of the three criteria (Hu & Bentler, 1999; Tabachnick & Fidell, 2007). In sample B, however, the fit of the two-factor model was not good. Therefore, we also examined the goodness of fit for two theoretically possible alternative models: a one-factor model (with all items loading on a single factor) and a three-factor model (with items for concurrent, switching, and sequential preferences as three distinct but intercorrelated factors). Chi-square tests were conducted to test the differences in model fits between the two-factor model and the two alternative models. The model fit indices and comparison results are presented in Table 1. In both samples, the three-factor model fits significantly better than the two-factor model; however, the two-factor model fits significantly better than the one-factor model, suggesting that it is questionable to conceptualize multitasking and sequential preferences as one dimension.

TABLE 1 CFA and model comparison results (study 2).

	CFI	RMSEA	SRMR	Chi-square	df	Chi-square difference	df difference	<i>p</i>
Sample A								
3-factor	0.96	0.086	0.031	171.15	74			
2-factor	0.951	0.094	0.035	193.93	76	22.78	2	<.001
1-factor	0.688	0.236	0.126	830.54	77	636.61	1	<.001
Sample B								
3-factor	0.934	0.089	0.052	324.04	74			
2-factor	0.882	0.116	0.063	520.24	76	196.2	2	<.001
1-factor	0.745	0.17	0.096	1041.65	77	521.41	1	<.001

Multitasking and sequential preferences in a bivariate space

Bivariate plots of the preferences and their intercorrelations in samples A and B are presented in Figures 1 and 2, respectively. In sample A, 32.95% of the participants scored higher than the scale midpoint (i.e., 4) on both sequential and multitasking preferences, 32.39% scored higher than the scale midpoint on both sequential and concurrent preferences, and 27.84% scored higher than the scale midpoint on both sequential and switching preferences. In sample B, 28.54% of participants scored higher than the scale midpoint on both sequential and multitasking preferences, 30.86% scored higher than the scale midpoint on both sequential and concurrent preferences, and 23.90% scored higher than the scale midpoint on both sequential and switching preferences.

Relations with other constructs

The descriptive statistics and correlations for samples A and B are reported in Tables 2 and 3, respectively. In both samples, multitasking preference and sequential preference had significantly positive and negative correlations with relative polychronicity, respectively (sample A: for multitasking preference $r = .84$, $p < .01$; for sequential preference $r = -.73$, $p < .01$; sample B: for multitasking preference $r = .54$, $p < .01$; for sequential preference $r = -.53$, $p < .01$). These results show that our scale has good convergent validity with existing scale items.

Moreover, multitasking and sequential preferences were correlated differently with goal orientations. In both samples, multitasking preference (but not sequential preference) consistently positively correlated with LGO (sample A: LGO and multitasking preference $r = .37$, $p < .01$; for sequential preference $r = -.15$, $p > .05$; sample B: LGO and multitasking preference $r = .29$, $p < .01$; LGO and sequential preference $r = -.09$, $p > .05$). On the other hand, sequential preference consistently positively correlated with PAGO (sample A: PAGO and sequential preference $r = .33$, $p < .01$; sample B: PAGO and sequential preference $r = .16$, $p > .01$). Multitasking preference's relationship with PPGO and PAGO was not consistent in the two samples.

In both samples, multitasking preference was positively correlated with one's subjective evaluation of their performance (sample A: $r = .18$, $p < .05$; sample B: $r = .15$, $p < .01$), whereas sequential preference did not significantly correlate with subjective performance (sample A: $r = -.03$, $p > .05$; sample B: $r = -.04$, $p > .05$). In the student sample, neither of the

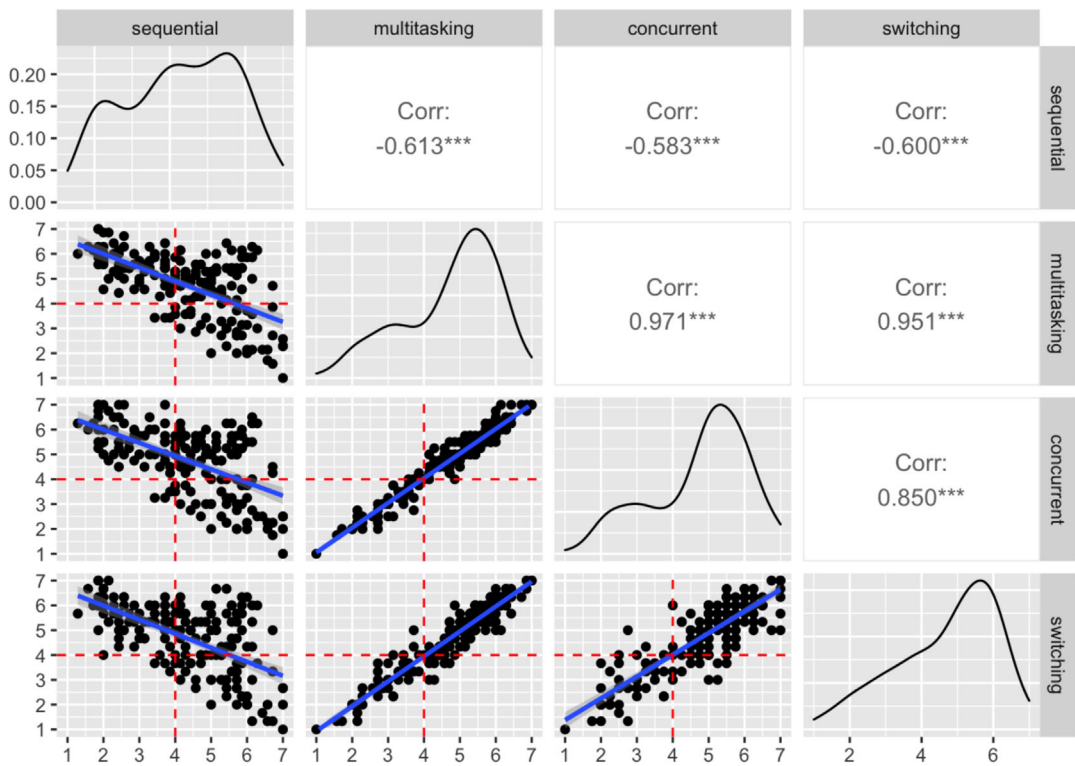


FIGURE 1 Bivariate plots of the preferences in sample A of study 2.

preferences significantly correlated with GPA (sample A: $r = -.05$, $p > .05$; sample B: $r = .09$, $p > .05$).

Finally, to examine the unique relation between multitasking or sequential preference with other variables, we also conducted multiple regressions with both preferences as predictors of the other variables (Table 4). In both samples, multitasking and sequential preferences uniquely predicted relative polychronicity (in opposite directions) and PPGO (in the same directions). In both samples, multitasking preference, but not sequential preference, uniquely and positively predicted subjective performance. Similarly, multitasking preference, but not sequential preference, was a stronger and more consistent predictor of LGO. The results for PAGO were not consistent in the two samples. Finally, neither multitasking nor sequential preference predicted students' GPA.

Discussion

Studies 1 and 2 showed that the two-factor model fits data reasonably well (in two of the three samples) and is consistently better than the one-factor model. Some evidence indicates that differentiating concurrent and switching preferences in the model could significantly improve the model fit, although they correlate with each other to a large degree.⁵

Importantly, we found that a non-negligible proportion of participants (around 30% in both samples) scored higher than the scale midpoint on both sequential and multitasking

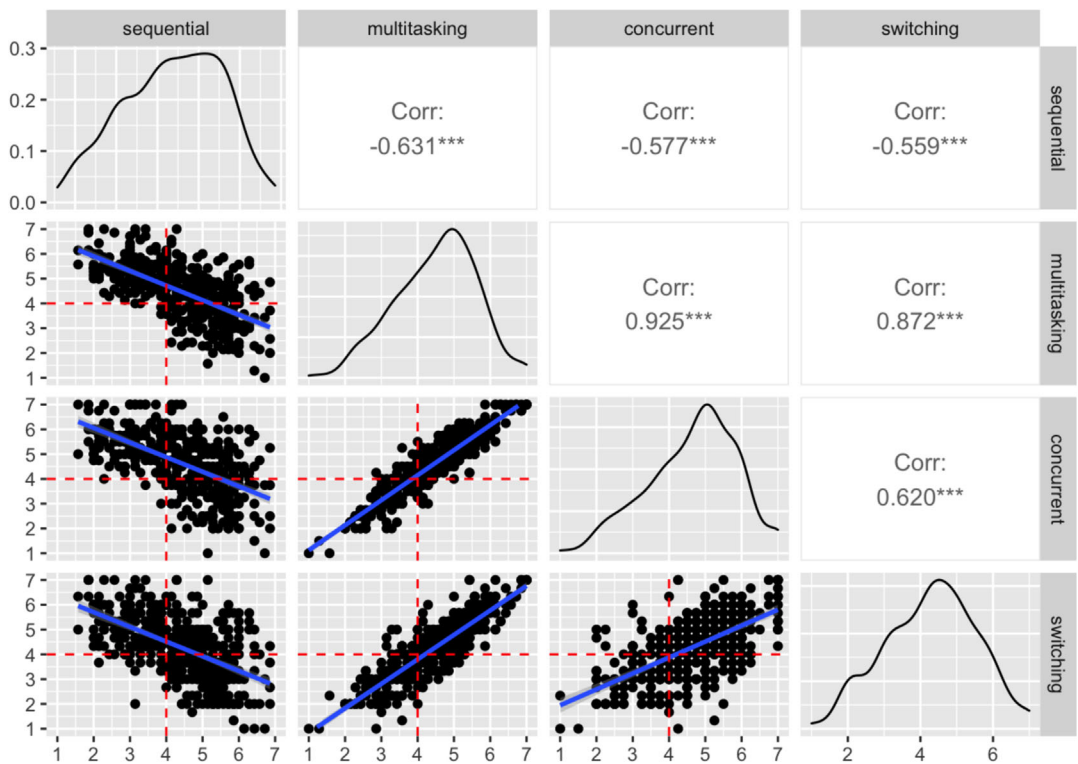


FIGURE 2 Bivariate plots of the preferences in sample B of study 2.

preferences, contrary to the assumption of the bipolarity measurement model (Tay & Kuykendall, 2017). These results reveal that the traditional theoretical assumption of multitasking and sequential preferences as two opposite ends of one continuum is not fully supported by the current data.

In addition, the one-continuum assumption would suggest that multitasking and sequential preferences are correlated with other variables in opposite directions. However, this is not fully supported by the current data either. For example, according to the one-continuum assumption, a positive correlation between polychronicity and LGO in previous research (e.g., Schell & Conte, 2008) would suggest that sequential preference is negatively associated with LGO. However, we consistently found that LGO is uniquely related to multitasking preference, but not sequential preference. Similarly, a positive correlation between polychronicity and subjective job performance in previous research (Howard & Cogswell, 2022) would suggest that those with stronger sequential preference would have lower subjective performance. However, in both samples, bivariate correlation and multiple regression analyses consistently showed that subjective performance is uniquely related to multitasking preference, but not sequential preference. These comparisons between our findings and previous research indicate that reconceptualizing multitasking and sequential preferences as two distinguishable (yet correlated) dimensions does not necessarily contradict previous research; however, by doing so, we could obtain more nuanced patterns potentially hidden in previous work and investigate the unique nomological networks of the two preferences.

TABLE 2 Means, standard deviations, and correlations with confidence intervals (study 2, sample A).

Variable	M	SD	1	2	3	4	5	6	7	8
1. Multitasking	4.74	1.32								
2. Sequential	4.29	1.48	−.61**							
			[−.70, −.51]							
3. Concurrent	4.78	1.35	.97**	−.58**						
			[.96, .98]	[−.67, −.48]						
4. Switching	4.69	1.39	.95**	−.60**	.85**					
			[.93, .96]	[−.69, −.50]	[.80, .89]					
5. Relative polychronicity	4.32	1.45	.84**	−.73**	.80**	.82**				
			[.79, .88]	[−.79, −.66]	[.74, .85]	[.76, .86]				
6. LGO	5.14	1.06	.37**	−.15	.39**	.32**	.34**			
			[.24, .49]	[−.29, .00]	[.26, .51]	[.18, .45]	[.20, .47]			
7. PPGO	4.60	1.27	.22**	.06	.21**	.21**	.14	.28**		
			[.08, .36]	[−.09, .21]	[.07, .35]	[.07, .35]	[−.00, .29]	[.14, .41]		
8. PAGO	3.90	1.44	−.06	.33**	−.09	−.02	−.16*	−.32**	.37**	
			[−.21, .09]	[.19, .45]	[−.23, .06]	[−.17, .12]	[−.30, −.01]	[−.45, −.18]	[.24, .49]	
9. Performance	75.80	14.39	.18*	−.03	.21**	.14	.10	.47**	.14	−.15
			[.04, .32]	[−.18, .11]	[.06, .34]	[−.01, .28]	[−.05, .25]	[.35, .58]	[−.01, .28]	[−.29, .00]

Note: M and SD are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. Abbreviations: LGO, learning goal orientation; PPGO, performance prove goal orientation; PAGO, performance avoid goal orientation. *indicates $p < .05$; **indicates $p < .01$.

TABLE 3 Means, standard deviations, and correlations with confidence intervals (study 2, sample B).

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Multitasking	4.50	1.12									
2. Sequential	4.37	1.19	−.63**								
			[−.68, −.57]								
3. Concurrent	4.66	1.22	.92**	−.58**							
			[.91, .94]	[−.64, −.51]							
4. Switching	4.30	1.26	.87**	−.56**	.62**						
			[.85, .89]	[−.62, −.49]	[.56, .67]						
5. Relative polychronicity	3.60	1.21	.54**	−.53**	.44**	.56**					
			[.47, .61]	[−.60, −.46]	[.36, .51]	[.49, .62]					
6. LGO	5.06	0.93	.29**	−.09	.29**	.23**	.08				
			[.21, .38]	[−.19, .00]	[.20, .38]	[.14, .32]	[−.02, .17]				
7. PPGO	4.73	0.97	.07	.09	.10*	.02	.00	.36**			
			[−.02, .17]	[−.01, .18]	[.01, .20]	[−.08, .11]	[−.09, .09]	[.27, .44]			
8. PAGO	3.83	1.17	−.14**	.16**	−.14**	−.12*	.01	−.38**	.21**		
			[−.24, −.05]	[.06, .25]	[−.23, −.04]	[−.22, −.03]	[−.09, .10]	[−.46, −.30]	[.11, .29]		
9. Performance	69.36	17.75	.15**	−.04	.15**	.12*	−.03	.27**	.12*	−.13**	
			[.06, .24]	[−.13, .06]	[.06, .24]	[.02, .21]	[−.13, .06]	[.18, .36]	[.03, .22]	[−.22, −.03]	
10. GPA	3.38	0.46	−.05	.09	−.05	−.05	−.13*	.14*	.01	−.02	.42**
			[−.16, .05]	[−.02, .19]	[−.16, .06]	[−.15, .06]	[−.23, −.02]	[.03, .24]	[−.10, .12]	[−.13, .09]	[.33, .50]

Note: *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. Abbreviations: LGO, learning goal orientation; PPGO, performance prove goal orientation; PAGO, performance avoid goal orientation.

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



TABLE 4 Multiple regression results from study 2.

Sample	Variable	Relative polychronicity			LGO			PPGO		
		Beta	95% CI	p-value	Beta	95% CI	p-value	Beta	95% CI	p-value
Sample A	Multitasking	0.62	0.53, 0.71	<.001	0.46	0.28, 0.63	<.001	0.42	0.24, 0.60	<.001
	Sequential	−0.35	−0.44, −0.26	<.001	0.13	−0.04, 0.31	.13	0.32	0.14, 0.50	<.001
	R ²		0.778			0.151			0.113	
	Adjusted R ²		0.775			0.141			0.103	
Sample B	Multitasking	0.35	0.25, 0.45	<.001	0.39	0.27, 0.51	<.001	0.22	0.09, 0.34	<.001
	Sequential	−0.31	−0.41, −0.21	<.001	0.15	0.04, 0.27	.010	0.23	0.10, 0.35	<.001
	R ²		0.355			0.100			0.036	
	Adjusted R ²		0.352			0.096			0.031	

Note: Beta is the standardized regression coefficient.

Abbreviations: CI, confidence interval; LGO, learning goal orientation; PPGO, performance prove goal orientation; PAGO, performance avoid goal orientation.

TABLE 4 (Continued)

Sample	PAGO	Performance			GPA		
		Beta	95% CI	p-value	Beta	95% CI	p-value
Sample A	0.22	0.05, 0.40	.014	0.26	0.07, 0.45	.007	/
	0.46	0.29, 0.64	<.001	0.13	−0.06, 0.31	.2	/
		0.138			0.043		/
		0.129			0.032		/
Sample B	−0.08	−0.20, 0.04	.2	0.21	0.09, 0.33	<.001	0.00
	0.11	−0.01, 0.23	.077	0.09	−0.03, 0.22	.13	0.09
		0.028			0.028		0.008
		0.024			0.024		0.002

Note: Beta is the standardized regression coefficient.

Abbreviations: CI, confidence interval; LGO, learning goal orientation; PPGO, performance prove goal orientation; PAGO, performance avoid goal orientation.

STUDY 3: RELATIONS WITH BEHAVIOR, PERFORMANCE, AND SUBJECTIVE EXPERIENCE IN A MULTITASKING ENVIRONMENT

In studies 1 and 2, we developed a new scale measuring multitasking and sequential preferences separately and provided initial evidence for their conceptual distinction. In study 3, we tested whether multitasking and sequential preferences measured by the current scale could (differently) predict individuals' actual behavior and subjective experience in a multitasking environment. We used a voluntary task-switching paradigm (Arrington & Logan, 2004) to simulate a multitasking work environment, mirroring real-world scenarios where multitasking is often a non-optional component of task management, although people may have some autonomy over the level of multitasking. There were multiple benefits of using this paradigm. First, it has been widely studied and validated (for a review, see Arrington et al., 2014), which could strengthen the internal validity and construct validity of our study.

Second, because of its voluntary nature, this paradigm can measure individual differences in actual multitasking behavior. Although some studies found that polychronicity positively predicted self-report multitasking behavior at work (e.g., Kirchberg et al., 2015; König et al., 2010), surprisingly little research has examined whether polychronicity could predict individuals' actual multitasking behavior tendency. By contrast, the current study measured multitasking behavior in an objective way. In this voluntary task-switching paradigm, participants were asked to perform two equally important tasks (i.e., there was a multitasking demand), where they could voluntarily switch tasks or repeat the same task on any given trial. Following previous research that operationalized multitasking behavior as the frequency of switching tasks (e.g., Szumowska & Kruglanski, 2022), we used the frequency of task switching (or repetition) as an index of actual multitasking tendency. The fact that individuals had multiple assigned task goals to pursue while they had the volition to decide how to perform the tasks mirrored many real-world work situations (e.g., a professor needs to write a paper and analyze data, but can choose how frequently to switch between them), thus strengthening ecological/external validity. According to past research using self-report measures, it is possible that individuals' multitasking preference would positively predict their task-switching frequency. However, past research has not found a significant relation between polychronicity and objective behavioral performance (Poposki & Oswald, 2010). It remains an open-ended question whether multitasking and sequential preferences, when measured separately, would be related to actual task-switch rates in the current behavioral paradigm.

Third, this paradigm allowed us to measure individuals' behavioral performance in this multitasking environment. Most previous research on the relationship between polychronicity and performance focused on work or academic performance, as we did in study 2 (for a review, see König & Waller, 2010). However, much less research has examined individuals' behavioral performance in a standardized multitasking context in the lab, and those studies did *not* find significant correlations between polychronicity and performance (Grawitch & Barber, 2013; König et al., 2005; Poposki & Oswald, 2010). One possibility is that multitasking and/or sequential preference could predict performance in a multitasking environment when they are measured separately rather than conflated. In this study, we tested this possibility. Moreover, we operationalized performance as individuals' switch costs in the task-switching paradigm. Previous research on voluntary task switching revealed robust switch costs in performance: longer reaction times when switching tasks than when repeating tasks (Arrington & Logan, 2004). They indicate the time and cognitive effort required to reconfigure one's task set for the new

task, which involves a voluntary and proactive act of control (Koch et al., 2018; Koch & Kiesel, 2022). Notably, switch costs are distinct from mixing costs, defined as worse performance when repeating a task in a mixed block with two potentially relevant tasks compared with repeating a task in a pure block, single-task context (e.g., Mari-Beffa & Kirkham, 2014; Rubin & Meiran, 2005). Given that switch costs are the result of the cognitive demands of task switching itself, whereas mixing costs address more general effects of task structure on performance (such as remembering the potentially relevant tasks), our study focused on examining switch costs. Individuals with high multitasking preferences may exhibit different switch costs due to their potential proficiency in handling multiple tasks or their ability to maintain activation levels of various task sets concurrently. To our knowledge, this is one of the first studies to test the relationship between multitasking preferences and switch costs.

Finally, we also tested whether individuals' multitasking and sequential preferences could predict their subjective experience in a multitasking environment (i.e., affective experiences and subjective perceptions of the task), by asking them to finish a self-report survey after completing the task-switching paradigm. Because this paradigm standardized the specific tasks that participants completed and measured their actual behavior, it allowed us to control the objective aspects of multitasking and test whether individuals' preferences would still be associated with their subjective experience. We measured individuals' subjective perception of multitasking behavior (Kapadia & Melwani, 2021) and performance. Research has shown that individuals can differ in their perceptions of the degree of multitasking even when they perform the same task in reality (Srna et al., 2018). In addition, we measured individuals' experienced affect (Watson et al., 1988) and level of activation (Feldman Barrett & Russell, 1998). Although previous research showed that they were potential outcomes of polychronicity (Poposki & Oswald, 2010) and multitasking behaviors (Kapadia & Melwani, 2021), it was unclear whether those effects were mainly driven by multitasking or sequential preference. By using our new measure, we tested the predictive validity of multitasking preference and sequential preference separately.

Method

Participants

A power analysis using G*Power 3.1 showed that a sample size of 193 was needed to detect a small-to-medium effect size ($r = .20$) with 80% power and an alpha level of .05. We aimed to recruit 200 participants, based on the resources available at the time when we conducted the study. A total of 199 undergraduate students participated for partial course credit. Participants were excluded from the analyses if they (a) were younger than 18 years old (three participants), (b) failed at least one of the two attention-check questions in the pre-survey (20 participants), or (c) did not finish the task-switching paradigm two participants). Of the remaining 174 participants, 35 were excluded because they had fewer than 10 task-switch trials, indicating very extreme task-repetition biases and providing unreliable estimation of task-switch mean reaction times.⁶ Therefore, 139 participants were included in the final analyses of the relationship between multitasking preferences and task-switching behavior.⁷ A sensitivity analysis using G*Power 3.1 suggested that based on the final sample size and the alpha level as .05, the minimum correlation that the study was sensitive to detect with 80% power was 0.23.

Procedure

Participants completed the study in lab rooms. After giving consent, they finished a survey on their multitasking and sequential preferences, followed by a voluntary task-switching paradigm. Participants were asked to perform two cognitive tasks: parity and magnitude judgments of single digits (randomly selected from 1 to 9, except 5). The parity task involved judging whether a digit is odd or even. The magnitude task involved judging whether a digit is smaller or larger than 5. On each trial, a digit stimulus was presented visually on a computer monitor and a task response was made by pressing a key on a computer keyboard, with reaction time measured from stimulus onset to response registration. Participants used different hands to perform the tasks, with hand-to-task mappings counterbalanced across participants. Half of the participants used their left hand to perform the parity task (pressing the D key for odd and the F key for even) and their right hand to perform the magnitude task (pressing the J key for smaller than 5 and the K key for larger than 5). The other half used the reverse hand-to-task mappings. As in previous research (Arrington & Logan, 2004), by recording which hand participants used to respond on each trial, we were able to classify which task they chose to perform and, by extension, when they repeated or switched tasks. In a practice phase, participants completed two blocks of 16 trials/block, where they performed one task (e.g., parity task) on all stimuli in a block. They received accuracy feedback after responding. In an experimental phase, they completed four blocks of 80 trials/block, where they chose which task to perform on each stimulus. Participants were instructed that the two tasks were equally important, but they should freely choose whichever task to perform, as they would naturally do. No feedback was given during the experimental trials. Afterward, participants finished a post-survey measuring some subjective outcomes.

Measures

Multitasking (Cronbach's $\alpha = .91$) and sequential preferences (Cronbach's $\alpha = .90$) were measured with the scale used in study 2.⁸ To measure participants' task switching frequency, after trial exclusion,⁹ we calculated each participant's proportion of task repetitions as the ratio of the number of repetition trials to the total number of trials included. A higher proportion of task repetitions indicated a lower behavioral tendency of task switching. To measure switch cost, we first calculated the mean correct reaction times and error rates of task-repetition and task-switch trials for each participant. Switch cost was calculated as the difference in reaction time (or error rate) between task switches and task repetitions. A higher switch cost indicated worse performance in task switching.

We also measured several constructs related to individuals' subjective experience during the task as potential outcomes of multitasking and sequential preferences. Participants self-reported *subjective multitasking* (i.e., their perception of experienced level of multitasking) in the task-switching paradigm, measured by three items from Kapadia and Melwani (2021; e.g., "I felt like I was multitasking"; Cronbach's $\alpha = .77$). They rated the items on a five-point scale (1 = "strongly disagree", 5 = "strongly agree"). Participants self-reported their *subjective performance* by rating how well they believed they performed in the task-switching paradigm from 0 (performed extremely bad) to 100 (performed extremely well), in terms of "speed," "accuracy," and "general performance" (Cronbach's $\alpha = .75$). Participants self-reported they experienced *affect* in the task-switching paradigm using the PANAS scale (Watson et al., 1988).

Nine items¹⁰ measured positive affect (e.g., “excited”; Cronbach's $\alpha = .84$). Ten items measured negative affect (e.g., “distressed”; Cronbach's $\alpha = .80$). Participants rated the items on a five-point scale (1 = “not at all”, 5 = “extremely”). Participants self-reported their current *level of activation* with three items from Kapadia and Melwani (2021; e.g., “I feel activated”; Cronbach's $\alpha = .77$). They rated the items on a scale from 0 (not at all) to 100 (extremely).

Results

On average, people chose to repeat tasks more often than switch tasks, indicated by a proportion of repetitions greater than 0.5 ($M = 0.73$, $SD = 0.16$). For switch costs, error rate was higher for switches ($M = 0.043$, $SD = 0.049$) than for repetitions ($M = 0.035$, $SD = 0.028$), and reaction time was longer for switches ($M = 988$ ms, $SD = 253$ ms) than for repetitions ($M = 745$ ms, $SD = 165$ ms), indicating costs when switching tasks.¹¹ These results replicate standard findings in voluntary task switching (Arrington & Logan, 2004). There was also a positive correlation between the proportion of repetitions and switch cost in reaction time ($r = .36$, $p < .01$), consistent with previous findings that switch costs increase as task-switch frequency decreases (Monsell & Mizon, 2006; Schneider & Logan, 2006).

We first tested the relations between multitasking preferences and objective task behavior. Table 5 shows neither multitasking preference ($r = .05$, $p > .05$) nor sequential preference ($r = -.04$, $p > .05$) significantly correlated with proportion of repetitions. Similarly, neither multitasking preference ($r = .01$, $p > .05$) nor sequential preference ($r = .05$, $p > .05$) significantly correlated with switch costs in reaction time.¹² To provide more evidence for the null findings, we also tested the correlations using Bayesian analysis (see Table 6). There is moderate evidence in favor of the absence of four (correlational) relationships between: (i) multitasking preference and proportion of repetitions ($r_{\text{median}} = 0.05$, $BF = 0.23$), (ii) sequential preference and proportion of repetitions ($r_{\text{median}} = -0.04$, $BF = 0.22$), (iii) multitasking preference and switch costs in reaction time ($r_{\text{median}} = 0.01$, $BF = 0.20$), and (iv) sequential preference and switch costs in reaction time ($r_{\text{median}} = 0.04$, $BF = 0.23$). We also conducted multiple regressions with the two preferences as predictors of the objective outcomes and did not find any significant effects (Table 7).

Next, we tested the subjective outcomes (Table 8). Multitasking preference ($r = .20$, $p < .01$) but not sequential preference ($r = -.05$, $p > .05$) significantly correlated with subjective multitasking. Similarly, multitasking preference ($r = .19$, $p < .01$) but not sequential preference ($r = -.06$, $p > .05$) significantly correlated with positive affect. Neither multitasking preference ($r = .12$, $p > .05$) nor sequential preference ($r = -.06$, $p > .05$) significantly correlated with subjective performance. Neither multitasking preference ($r = .07$, $p > .05$) nor sequential preference ($r = .01$, $p > .05$) significantly correlated with negative affect. The level of activation significantly positively correlated with multitasking preference ($r = .31$, $p < .01$) and negatively correlated with sequential preference ($r = -.30$, $p < .05$). To test the robustness of the relationship between preferences and subjective outcomes, we also controlled for the proportion of repetitions and switch costs in reaction time using multiple regressions. The direction and significance of these relations remained, suggesting that these effects were over and above actual task behavior.

To test the unique effects of multitasking and sequential preferences, we also conducted multiple regressions (Table 9). The results suggested that multitasking preference, but not sequential preference, uniquely and positively predicted participants' positive affect and psychological activation in the task.

TABLE 5 Means, standard deviations, and correlations with confidence intervals (study 3, objective behaviors).

Variable	M	SD	1	2	3	4	5	6	7	8
1. Multitasking preference	3.82	1.24								
2. Sequential preference	4.77	1.19	−.82**							
			[−.87, −.76]							
3. PropTaskRep	0.72	0.16	.05	−.04						
			[−.12, .21]	[−.21, .12]						
4. SwitchCost_RT	242.76	178.98	.01	.05	.36**					
			[−.16, .18]	[−.12, .21]	[.20, .49]					
5. SwitchCost_ER	0.87	3.73	.07	−.07	−.19*	−.17*				
			[−.10, .23]	[−.24, .09]	[−.35, −.03]	[−.33, −.01]				
6. TaskSwitch_RT	987.97	252.76	−.00	.06	−.06	.76**	−.10			
			[−.17, .16]	[−.11, .22]	[−.22, .11]	[.68, .82]	[−.26, .07]			
7. TaskSwitch_ER	4.32	4.86	.09	−.06	.01	−.07	.82**	−.12		
			[−.08, .25]	[−.23, .11]	[−.16, .18]	[−.24, .09]	[.75, .87]	[−.28, .05]		
8. TaskRepetition_RT	745.21	165.35	−.02	.04	−.48**	.08	.04	.71**	−.10	
			[−.18, .15]	[−.13, .21]	[−.60, −.34]	[−.09, .24]	[−.13, .20]	[.61, .78]	[−.26, .07]	
9. TaskRepetition_ER	3.45	2.80	.06	−.01	.27**	.10	.08	−.07	.64**	−.22**
			[−.11, .22]	[−.17, .16]	[.11, .42]	[−.06, .27]	[−.08, .25]	[−.23, .10]	[.53, .73]	[−.37, −.05]

Note: M and SD are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. Abbreviations: PropTaskRep, proportion of task repetition trials; RT, reaction time; ER, error rate. *indicates $p < .05$; **indicates $p < .01$.

TABLE 6 Bayesian analysis results (study 3, objective behaviors).

Variable 1	Variable 2	Median correlation	95% CI	Pd	ROPE	% in ROPE	BF	Prior
Multitasking preference	PropTaskRep	0.05	[−0.12, 0.21]	71.67%	[−0.05, 0.05]	41.61%	0.228	Beta (3 + − 3)
Sequential preference	PropTaskRep	−0.04	[−0.20, 0.13]	68.20%	[−0.05, 0.05]	40.37%	0.222	Beta (3 + − 3)
Multitasking preference	SwitchCost_RT	0.01	[−0.15, 0.17]	55.20%	[−0.05, 0.05]	47.29%	0.198	Beta (3 + − 3)
Sequential preference	SwitchCost_RT	0.04	[−0.12, 0.21]	70.95%	[−0.05, 0.05]	42.00%	0.227	Beta (3 + − 3)

Abbreviations: PropTaskRep, proportion of task repetition trials; RT, reaction time; pd, probability of direction; ROPE, region of practical equivalence; BF, Bayes factor.

TABLE 7 Multiple regression results (study 3, objective behaviors).

Variable	PropTaskRep			SwitchCostRT			SwitchCostER			TaskSwitchRT		
	Beta	95% CI	p-value	Beta	95% CI	p-value	Beta	95% CI	p-value	Beta	95% CI	p-value
Multitasking	0.04	−0.26, 0.34	.8	0.15	−0.14, 0.45	.3	0.02	−0.27, 0.32	.9	0.14	−0.15, 0.44	.3
Sequential	−0.01	−0.31, 0.29	>.9	0.17	−0.12, 0.47	.2	−0.06	−0.35, 0.24	.7	0.18	−0.12, 0.47	.2
R ²	0.002			0.010			0.006			0.010		
Adjusted R ²	−0.012			−0.005			−0.009			−0.004		

Abbreviation: CI, confidence interval.

TABLE 7 (Continued)

Variable	TaskSwitchER			TaskRepRT			TaskRepER		
	Beta	95% CI	p-value	Beta	95% CI	p-value	Beta	95% CI	p-value
Multitasking	0.11	−0.18, 0.41	.4	0.05	−0.24, 0.35	.7	0.17	−0.13, 0.46	.3
Sequential	0.03	−0.26, 0.33	.8	0.08	−0.21, 0.38	.6	0.13	−0.17, 0.43	.4
R ²	0.008			0.003			0.009		
Adjusted R ²	−0.007			−0.012			−0.006		

Abbreviation: CI, confidence interval.

TABLE 8 Means, standard deviations, and correlations with confidence intervals (study 3, subjective experience).

Variable	M	SD	1	2	3	4	5	6
1. Multitasking preference	3.82	1.24						
2. Sequential preference	4.77	1.20	-.83** [-.87, -.76]					
3. Subjective multitasking	3.79	0.84	.20* [.03, .35]	-.05 [-.21, .12]				
4. Subjective performance	75.07	13.15	.12 [-.05, .28]	-.06 [-.23, .11]	.13 [-.03, .30]			
5. Positive affect	2.69	0.67	.19* [.02, .34]	-.10 [-.26, .07]	.16 [-.00, .32]	.18* [.02, .34]		
6. Negative affect	1.60	0.52	.07 [-.10, .24]	.01 [-.16, .17]	.11 [-.06, .28]	-.19* [-.35, -.02]	.35** [.19, .49]	
7. Activation	50.36	21.57	.31** [.14, .45]	-.20* [-.36, -.03]	.21* [.04, .37]	.10 [-.07, .26]	.66** [.55, .75]	.39** [.23, .52]

Note: M and SD are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation.

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

TABLE 9 Multiple regression results (study 3, subjective experience).

Variable	SubMultitask			SubPerform			PosAffect			NegAffect			Activation		
	Beta	95% CI	p-value	Beta	95% CI	p-value	Beta	95% CI	p-value	Beta	95% CI	p-value	Beta	95% CI	p-value
Multitasking	0.50	0.21, 0.79	<.001	0.22	−0.08, 0.52	.15	0.32	0.02, 0.62	.034	0.24	−0.06, 0.54	.11	0.45	0.16, 0.74	.003
Sequential	0.37	0.07, 0.66	.015	0.12	−0.18, 0.43	.4	0.17	−0.13, 0.46	.3	0.21	−0.09, 0.51	.2	0.17	−0.12, 0.47	.2
R ²	0.081			0.019			0.043			0.019			0.104		
Adjusted R ²	0.067			0.005			0.029			0.004			0.090		

Abbreviation: CI, confidence interval.

Discussion

In this study, we tested the relationships between multitasking/sequential preference and individuals' behavior and subjective experience in the voluntary task-switching paradigm. On the one hand, although the voluntary task-switching results were consistent with previous findings (e.g., Arrington & Logan, 2004), we did not find evidence for relations between preferences and task-switching performance. On the other hand, we did find that our measure of the preferences predicted some subjective experience. Participants who generally enjoyed multitasking reported more positive affect and a higher level of activation after performing the tasks. In sum, this study provides initial evidence of the validity of the current scale. It not only connects and extends previous research on multitasking behavior, performance, and subjective experience, but also makes important contributions to the literature by showing the potential value of measuring multitasking and sequential preferences separately.

GENERAL DISCUSSION

In this work, we empirically tested whether individuals' preferences for multitasking and sequential tasking during multiple goal pursuit are opposite to each other—a long-standing assumption in the polychronicity literature. We developed a new scale to measure individual preferences in multiple goal pursuit by revising items in previous scales of polychronicity and parsing out multitasking and sequential preferences independently. The scale allows one to test the relationship between the preferences in an uncontaminated way.

We found three pieces of evidence that cannot be fully explained by the one-continuum assumption of polychronicity. First, factor analytic results consistently showed that the one-factor model was inferior to the two-factor model or three-factor model, which differentiated sequential preference from multitasking preference, suggesting that the two preferences are related but may have unique components. Second, the one-continuum assumption would suggest that the two preferences should relate to other constructs in opposite directions. In contrast, in the current data, bivariate correlations and multiple regressions showed that the two preferences were differently related to some psychological constructs (e.g., goal orientations, subjective performance, subjective multitasking). Third, the bipolarity measurement model would also suggest that people will not be able to score high on both multitasking and sequential preferences. By contrast, the current data showed that although the two preferences were strongly correlated, it was not uncommon for some participants to score above the midpoints on both multitasking and sequential preferences. Overall, the current study suggests that multitasking and sequential preferences might not be as contradictory as assumed in previous research. We also replicated these findings with modifications to the scale in the supplementary study.

Contributions

To our knowledge, the current research is the first that formally examined the polarity of polychronicity. Whereas previous studies assumed that multitasking preference is the opposite of sequential preference (e.g., Lindquist & Kaufman-Scarborough, 2007; Poposki & Oswald, 2010), our research empirically examined this conceptualization. Methodologically, this effort

contributes to the recent call for research on the continuum specification of psychological constructs (Tay & Drasgow, 2012; Tay & Jebb, 2018). Theoretically, our research systematically integrates and differentiates potential dimensions of polychronicity and leads to several conceptual implications and new questions for future research on multiple goal pursuit.

Synthesizing and reinterpreting existing polychronicity measures

The current work does not invalidate previous polychronicity research. Instead, our findings offer an opportunity to integrate different measures. Although previous research has different operationalizations of multitasking when measuring polychronicity, our findings suggest that the concurrent and task-switching forms are both relevant in measuring multitasking preference and they show similar relations with sequential preference. This new measure integrates scales that define multitasking as concurrent pursuit (e.g., Bluedorn et al., 1999) and those measuring multitasking as task switching (e.g., Poposki & Oswald, 2010). This empirical evidence is in line with Howard and Cogswell's (2022) argument that both dimensions should be included in the conceptualization and measurement of polychronicity.

In addition, although the finding that multitasking preference and sequential preference can be separate dimensions casts doubt on the theoretical assumptions of previous research, it also offers another way to interpret previous measures. The scales that include items that directly contradict the two preferences and reverse-code sequential preference items (e.g., Poposki & Oswald, 2010) might be better understood as measuring the *relative* preference for multitasking over sequential tasking, which by itself has predictive validity. Our research findings take this a step further to suggest that multitasking and sequential preferences might have unique implications when considered separately. Some outcomes of polychronicity found in previous research may be mainly attributed to a higher (lower) degree of multitasking preference while others might be more related to a lower (higher) degree of sequential preference. Our exploratory research has already shown some constructs differentially related to the two preferences. With this new measurement tool, future research can replicate our findings in a confirmatory manner and develop new theories to systematically explain and identify different predictors and outcomes of the two preferences.

Uncovering the coexistence of multitasking and sequential preferences

As a result of conceptualizing multitasking and sequential preferences as potentially separate dimensions, we can consider (and indeed find) individuals with high preferences for both strategies, whereas previous approaches necessitate an inherent trade-off between the two. A critical next step enabled by our current research is to theorize about the conceptual meaning of the coexistence of preferences for both strategies. Although our exploratory research did not have a priori predictions, one possible explanation is that high preferences for both strategies reflect one's flexibility in self-regulation (Bonanno & Burton, 2013), because both strategies can be effective in different multiple-goal situations (Kung & Scholer, 2020; Orehek & Vazeou-Nieuwenhuis, 2013) and positive attitudes towards both strategies may enable individuals to flexibly adapt in different situations.

This speculation is related to the concept of adaptive performance, defined as responsiveness to changing job requirements (Jundt et al., 2015). Previous research from a person-environment fit perspective suggests the person-job fit on the polychronicity dimension would

predict desirable work outcomes (Hecht & Allen, 2005; Slocombe & Bluedorn, 1999; Wu et al., 2020). However, these studies excluded the possibility that some jobs might involve high multitasking and high sequential tasking at the same time, with rapidly changing demands over time or across different job aspects. For example, a restaurant server need not only rapidly switch among multiple tables simultaneously (i.e., multitasking) but also accurately serve multiple courses one by one according to the right order for a given table (i.e., sequential tasking). In those cases, we would expect that individuals with higher preferences for both strategies fit best in that environment and thus might have better adaptive performance and well-being.

Integrating and bridging multitasking research in different disciplines

The current research bridges different fields of research. Although we follow the individual difference tradition in polychronicity research to study multitasking from a preference or attitude perspective, the finding that the two preferences can be separate also mirrors a recent finding in cognitive psychology that challenges the so-called stability–flexibility tradeoff (Gedder & Egner, 2022). The current research adds to that work by suggesting that multitasking and sequential pursuit are not necessarily antithetical both on the individual preference level and on the cognitive ability level. Just as individuals can be cognitively flexible and stable at the same time, some people might enjoy both multitasking and sequential strategies. In addition, study 3 serves as one of the first efforts to link multitasking/sequential preference with the voluntary task-switching paradigm in cognitive psychology. Building upon our findings, future research could investigate how organizations can leverage employees' potential on both multitasking and sequential tasking.

Furthermore, in the current research, we intentionally operationalized and measured multitasking and sequential strategies in the context of pursuing multiple “tasks” and “goals” because the two concepts tend to be mutually defined and are sometimes used interchangeably in different literatures. On the one hand, in the multiple goal literature, goals are seen as organized in a hierarchy, which includes tasks, projects, personal goals, and so forth (Unsworth et al., 2014). Multitasking has been studied as a strategy to pursue multiple conflicting goals (Kung & Scholer, 2020). On the other hand, in the multitasking and polychronicity literature, goal intention has been viewed as an integral part of task pursuit. For instance, Poposki and Oswald (2010) defined a task as “a discrete set of activities engaged in for the purposes of attaining a goal,” and Grange and Houghton (2014) noted that being “able to select the appropriate task based on current goals and intentions” is a critical aspect of task switching. More recently, a review of workplace task transitions defined multitasking as “the intention to pursue multiple goals at the same time” (Leroy et al., 2020). Moreover, various terms have been used as the target of pursuit in existing scales of polychronicity, including projects, activities, tasks, assignments, and things. In the present context, we integrated the two literatures by using tasks and goals as two interchangeable concepts to capture individuals' experiences broadly across different work and life domains. In our supplementary study, we also tried to separate tasks and goals in two versions of the scale and still found consistent results across those contexts.

Polychronicity in relation to objective performance and subjective experience

The findings in study 3 support and extend past literature showing that polychronicity might be more relevant to individuals' subjective experience compared with objective outcomes. First, in

line with past findings (e.g., Poposki & Oswald, 2010), we found that multitasking preference was related to positive affect in a multitasking environment. More importantly, besides replicating these findings, the current study makes unique contributions to this literature by showing that multitasking preference might be a more consistent and stronger predictor of these subjective outcomes than sequential preference. Multitasking preference, but not sequential preference, significantly predicted one's subjective multitasking and positive affect, again suggesting that the two preferences might have overlapping but unique nomological networks. Second, the finding that multitasking (but not sequential) preference predicted perception of experienced multitasking beyond actual task-switching frequency is novel and intriguing. It suggests that a preference for multitasking might give people an illusion that they are multitasking to a larger degree, even if it is not true objectively. This is important given some evidence showing that subjective perception of multitasking could increase one's actual work performance in certain contexts (Srna et al., 2018). In addition, this finding is in line with previous research showing that polychronicity predicted self-report measures of multitasking behaviors (e.g., Kirchberg et al., 2015; König et al., 2010); however, these findings might be qualified by the self-report nature of the multitasking measure, as we did not find evidence for prediction of objective multitasking behavior (at least as operationalized in our context).

Meanwhile, we did not find a significant relation between the two preferences and objective outcomes (i.e., task-switching frequency and switch costs). This pattern is in line with existing studies that used previous polychronicity scales and did not find a direct effect of polychronicity on standardized multitasking performance in lab contexts (Grawitch & Barber, 2013; König et al., 2005; Poposki & Oswald, 2010). This result suggests that separating multitasking and sequential preferences still could not predict one's actual performance in standardized lab tasks. Similarly, in the task-switching literature, a recent study did not find evidence of any relationship between individual differences in self-reported media multitasking tendency and task-switching performance (Schneider & Chun, 2021). These findings together cast doubts on the relations between individuals' self-reported multitasking preference/tendency and their actual multitasking performance. Notably, the lack of significant relations between the two preferences and objective outcomes does not diminish the value of the current scale, because it can still predict other theoretically relevant constructs across studies (i.e., studies 2 and 3, and supplemental material), which have meaningful real-life implications (e.g., employees' emotional reactions when they are required to multitask at work). To further explore the implications of the scale, future research could examine the conditions under which it might predict task performance more effectively. For example, researchers could collect data in organizations to test whether the two preferences can predict employees' performance in more naturalistic settings that reflect real-world multitasking demands, rather than highly controlled lab contexts.

Limitations

Like all studies, our research has limitations. First, the findings might not generalize to people from different cultural backgrounds. Across the studies, due to the sampling methods, the participants were all based in the United States and were predominantly White. Past research has shown mixed findings concerning cultural differences in polychronicity (König & Waller, 2010). The relationship between multitasking preference and sequential preference might vary across cultures. Future research should validate the scale with more diverse samples and replicate the findings in different contexts. Second, we relied mainly on factor analysis to test the

dimensionality of the scale. Although it is suitable for dimensionality tests when the construct is bipolar or unipolar (Tay & Jebb, 2018), factor analysis has limitations, such as generating spurious factors due to method effects or wording effects when the construct is unidimensional. However, we also showed evidence from other perspectives, such as examining the proportion of high scores on both preferences and correlating the preferences with other constructs. Third, our research mainly relies on correlational methods with observational data from self-reports and a behavioral paradigm. Future research could use experimental manipulations to test whether multitasking and sequential preferences can be independently increased or decreased, which would offer even stronger evidence for the idea that they are distinguishable. Lastly, although study 3 employed a common task-switching paradigm, we recognize that this context is but one of many where multitasking preferences may play a role, and the full spectrum of multitasking behavior in real-world scenarios remains an area for further exploration.

CONCLUSION

Past research on polychronicity has assumed that multitasking preference and sequential preference are two opposite ends of one continuum. The current research is the first to empirically test this long-held assumption. We observed that the two preferences, while correlated, have unique components and may relate to other constructs in different ways. Importantly, the discovery of individuals who exhibit high levels of both preferences challenges the conventional bipolarity model. We also provided a measure that integrates different conceptualizations of multitasking. This work invites researchers to consider a more nuanced conceptualization of multiple goal pursuit preferences and paves the way for a deeper understanding of polychronicity, emphasizing its potential multidimensionality and its broader psychological and practical implications. Future research should build on this foundation, exploring the influence of different goal pursuit preferences and strategies in various contexts.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

All data and analysis codes are available at: <https://bit.ly/3xDmg8X>.

ETHICS STATEMENT

All studies were carried out in accordance with the relevant ethical guidelines and regulations for research with human subjects and were approved by the affiliated university's Institutional Review Board (No. IRB-2019-43; IRB-2021-551).

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ENDNOTES

- ¹ Notably, monochronicity reflects the preference for a sequential approach within multiple-goal contexts, rather than the preference for pursuing a single goal (i.e., the difference between prioritizing and choosing; Kung & Scholer, 2020).

- ² It can also be seen as a “combinatorial construct,” where two constructs with unipolar continua are made opposite to each other and merged into one continuum, combining unipolar and bipolar conceptualizations (Tay & Jebb, 2018).
- ³ In our study, multitasking is characterized by engaging in multiple tasks that each serve unique goals. However, this framework accommodates the idea that these tasks, while distinct, may also represent sub-components within an overarching, higher-order goal. In this example, although there is an overarching goal of meal provision, we consider preparing different types of meals—vegetarian and meat—as separate tasks, each with distinct goals: to satisfy specific dietary preferences. Similarly, although salad preparation can be seen as part of a larger goal (e.g., completing a vegetarian meal), it is still regarded as an independent task that requires distinct planning and resources.
- ⁴ The eigenvalue for three factors was 0.35—lower than 1—suggesting that a three-factor solution is not ideal.
- ⁵ Considering all the evidence across studies, and that the two-factor structure consistently fits data well in the more (nationally) representative samples from Mturk, in the following correlational analyses we focus on the results for multitasking and sequential preferences. Results for concurrent and switching preferences are also reported in the tables.
- ⁶ Including these participants did not change the results. Independent-samples *t*-tests showed that these participants did not differ from the rest on polychronicity and monochronicity scores.
- ⁷ Among these participants, two did not finish the post-survey and one failed the attention-check questions; they were excluded, leaving 136 participants in the final analyses involving self-report outcomes in the post-survey.
- ⁸ CFA showed the two-factor model fit the data well (CFI = 0.95, RMSEA = 0.078, SRMR = 0.048) and significantly better than the one-factor model (CFI = 0.918, RMSEA = 0.101, SRMR = 0.052), $\chi^2_{\text{diff}}(1) = 46.29$, $p < .001$.
- ⁹ As in previous voluntary task-switching studies (e.g., Arrington & Logan, 2004), we excluded from all analyses (a) the first trial of each experimental block because it lacks a task-transition state (i.e., neither task repetition nor task switch) and (b) trials with excessively long reaction times (i.e., three standard deviations above a participant's mean reaction time) because those trials might reflect unusual or inattentive performance.
- ¹⁰ There were 10 items for positive affect in the original scale. Due to an error in survey implementation, the first item (“interested”) was not included, resulting in nine items.
- ¹¹ Paired-sample *t*-tests indicated that both differences were significant: for error rate, $t(138) = 2.75$, $p < .01$; for reaction time, $t(138) = 15.99$, $p < .001$. Given that error rates were extremely low (<5%), we followed common practice in the task-switching literature and focused on the switch cost in reaction time ($M = 243$ ms, $SD = 179$ ms) in the main analyses.
- ¹² Because both proportion of repetitions and switch costs in reaction time were not normally distributed, to test the robustness of the findings, we also calculated percentage-bend correlations (Wilcox, 2012) using the WRS2 R package (Mair et al., 2021), which is a robust measure of the linear association between two random variables. The results were consistent.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX

Instruction: “People perform many and varied goals/tasks in life (e.g., work, health, social, leisure). To what extent do you agree or disagree with the following statements in describing your general preference when you pursue multiple goals?” from *1-strongly disagree* to *7-strongly agree*.

Concurrent Preference:

1. **I like to pursue several tasks or goals at the same time.**
2. **I prefer to achieve parts of several goals at the same time.**
3. I like to work on more than a single task or goal at the same time.
4. I am comfortable pursuing several goals at the same time.
5. **I like to work on several tasks or goals in parallel.**
6. **I like to pursue two or more goals concurrently.**
7. I tend to pay parallel attention toward two or more goals.

Sequential preference:

8. **I like to achieve an entire goal at a time.**
9. **I prefer to pursue one goal at a time.**
10. **I like to achieve a goal completely before focusing on another goal.**
11. **It makes me uncomfortable when I am not able to attain one goal completely before focusing on another goal.**
12. **I have a preference for working in an environment where I can accomplish one goal before starting the next.**
13. **I have a “one-track” mind when pursuing my goals.**
14. **When I have several tasks or goals, I prefer to achieve them one by one.**

Switching preference:

15. I like to switch back and forth between two or more goals.
16. **I feel engaged in what I am doing if I am able to switch between several different goals.**
17. I like switching back and forth between several goals.
18. **When I have a goal to pursue, I like to break it up by switching to other goals intermittently.**
19. **I like to shift my attention between multiple goals.**
20. I like to stop in the middle of one goal to work on another.
21. I would like to work in a job where I was constantly shifting from one goal to another.

Note: Items in bold remained after EFA and item reduction and were used in Study 2.