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Measuring implemental delay in procrastination: Separating onset and sustained goal striving

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ABSTRACT

Scales measuring procrastination focus on different aspects of unnecessary and unwanted delay, delay in task implementation – an increased gap between intention and action – being a core characteristic. However, an inspection of existing procrastination scales reveals that the scales do not distinguish between two facets of implemental delay, *onset delay*, and delay related to *sustained goal striving*. We trace this failure to an imprecise understanding of "delay," another core concept in procrastination. This paper discusses the relationship between onset and sustained delay in procrastination, and then describes a new scale attempting to measure these two facets of task implementation. In two studies (aggregated $N = 465$) we demonstrate, using exploratory and confirmatory factor analysis, that although onset and sustained action procrastination measures correlate, they are still separate facets of implemental procrastination. Problems with onset delay seem to be particularly important, increasingly so in high procrastinators. Implications, as well as suggestions for further research, are discussed.

1. Measuring implemental delay in procrastination: Separating onset vs. sustained goal striving

Motivated behavior extends over time. Following a decision, the individual must plan how to implement it, then follows goal striving or implementation, and finally goal attainment if successful (e.g., Achtziger & Gollwitzer, 2018). People may procrastinate – delay unnecessarily – in all these stages (e.g., Svartdal & Steel, 2017), and scales have been developed to measure procrastination in each. For example, the Decisional Procrastination Scale (DPS, Mann, 1982, unpublished; Mann, Burnett, Radford, & Ford, 1997) focuses on delay in decision-making and onset of implementation. General procrastination scales, such as the General Procrastination Scale (GPS; Lay, 1986) address various examples of implemental delay. Finally, McCown and Johnson's Adult Inventory of Procrastination Scale (AIP; McCown, Johnson, & Petzel, 1989) includes items related to promptness, meeting deadlines, and timeliness.

A closer inspection of the procrastination literature reveals, however, that although implemental delay is a key feature of the procrastination problem (e.g., Klingsieck, 2013; Steel, 2010), this core concept has rarely been explicated in the procrastination literature. By definition, procrastination is a dysfunctional delay of intended behavior, with procrastinators tending to demonstrate larger intention-action gaps compared to non-procrastinators (e.g., Steel, Brothen, & Wambach, 2001). However, as reviewed by Sheeran and Webb (2016), the intention-action gap addresses three rather distinct phases of goal pursuit – *initiation, maintenance*, and *close* when the goal has been attained. Sheeran and Webb noted that different factors are involved when problems occur in these phases. For example, failure to get started may be rooted in factors such as forgetting to start, indecision about means, second thoughts, and failure to engage in preparatory behaviors. On the other hand, not keeping goal pursuit on track relates to factors such as failure to monitor goal progress, competing goals, bad habits, disruptive thoughts and feelings, and low willpower. In support, Steel and Weinhardt (2018) adopt a similar three-stage model for their Goal Phase System and note that the motivational forces operating during the beginning of a goal are not necessarily the same as those later, particularly during goal-striving or realization. For example, high ex-

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pectancy or confidence assists the initial goal choice but can have a negative effect during goal-striving as those overconfident in their abilities may underinvest in allocation of time and resources. Similarly, impulsiveness can have a neutral or positive effect with goal choice, interacting with extrinsic rewards, but often hampers goal striving until just before deadlines.[1]

Unfortunately, the procrastination literature seems to have focused primarily on delay in goal pursuit initiation, often neglecting that procrastination manifests itself also in goal maintenance pursuit (cf. Gollwitzer, 2014). One reason for this situation may be that *delay* – a defining criterion for procrastination – is ambiguous. Often, "delay" is used as a temporal judgment of unnecessary delay (e.g., as in item 2 in the DPS, "Even after I make a decision I delay acting upon it"), and some seem to restrict procrastination to such cases (Tice, Bratslavsky, & Baumeister, 2001, p. 63). However, "delay" is also used in another meaning, referring to indirect delays as a result of impulsive diversions and other forms of wasting time during intention implementation (as in item 12, GPS, "In preparing for some deadline, I often waste time by doing other things"). We argue that both usages are legitimate, but that the first seems to be the default interpretation whereas the second has often been overlooked in the procrastination literature, and especially so in scales measuring procrastination. In the next paragraph, we expand on these two arguments. Then we present, in two studies, a new scale attempting to measure two facets of implemental delay, *onset delay,* and *delay in sustained goal striving.*

1.1. On "delay" as used in defining the procrastination construct

Procrastination is defined by two core characteristics, the first being the delay of some intended behavior, the second that this delay is chosen despite realizing the negative consequences of the delay (Klingsieck, 2013; Steel, 2007). The latter criterion implies that procrastination is "irrational" in the sense that the individual acts against better judgment, often referred to as akrasia (Andreou & White, 2010). This understanding of procrastination implies that internal norms and cognitive-affective evaluations of delay play an important role in identifying procrastination (Milgram & Naaman, 1996; van Eerde, 2000). Furthermore, procrastination must be distinguished from rational forms of delay, as many forms of delay of intended behavior may be adaptive, rational, and beneficial.

Importantly, a definition of procrastination in terms of delay despite better judgment may leave the impression that all forms of procrastination are defined in terms of timing. Given a model of goal-directed action flow from deliberation → planning → action → evaluation (e.g., Achtziger & Gollwitzer, 2018), timing would primarily be relevant in the transitions between deliberation and decision (decisional procrastination), between intention formation and intention realization (the intention-action gap), and finally in goal attainment (e.g., timeliness). In these cases, unnecessary or irrational delay may be observed in accordance with the above definition. However, many instances of intended acts unfold over longer periods where dilatory behaviors may manifest themselves in ways that create indirect delays in goal striving, yet without involving delays according to temporal criteria. First, engaging in competing activities may delay goal-directed behavior in an indirect way, as less time – and less adequate time – is spent on the prioritized goal activity (cf. Lay, 1986, Study II). Accordingly, several scales contain items addressing preference for other activities, as for example the GPS (Lay, 1986) item 1 ("In preparation for some deadline, I often waste time by doing other things") and the IPS (Steel, 2010) item 4 ("When I should be doing one thing, I will do another)." Note that for these items there is no mention of delay per se; delay in goal implementation results from engaging in competing activities. Accordingly, experience sampling of procrastination (e.g., Pychyl, Lee, Thibodeau, & Blunt, 2000, Table 1) focuses on activities that people actually do at the moment (e.g., watching TV) versus what they should have been doing (e.g., studying), defining "procrastination" as doing something other than what one should do. Second, a closely related variant of diversion during goal-striving occurs when goal-directed behavior is impulsively diverted to more tempting situational alternatives, indirectly creating delays in realizing goals (Schouwenburg, 1995; Steel, 2007; Steel, Svartdal, Thundiyil, Brothen, 2018). Such impulsive diversions may address distractions and temptations that are available to the individual, and susceptibility to them indicate present-bias preferences characteristic of procrastinators (Steel et al., 2018). Examples include giving in to more pleasurable alternatives compared to continued goal striving (e.g., watching TV instead of reading), dysfunctional forms of mood-regulation (Sirois & Pychyl, 2013; Tice & Bratslavsky, 2000), and escape/avoidance from something aversive (e.g., escaping from a stressful or boring task). Such forms of delay reduce the amount of time spent on focal tasks (e.g., Tice et al., 2001, Experiment 3). Finally, procrastination during goal-striving may result from other overlapping factors, such as poor self-monitoring, competing goals, dysfunctional habits, poorly formulated goal intentions, low willpower, concentration problems, tiredness, and task aversion (Gollwitzer, 2014; Schouwenburg, 1995; Sheeran & Webb, 2016; Steel et al., 2018). Also, note that a conception of procrastination as a breakdown in self-regulation (Steel, 2007) implies that much of the procrastination problem expresses itself during the goal-striving phase.

Concluding from these examples, we suggest that "delay," although being a core criterion for procrastination, has remained inadequately clarified in the procrastination literature. Whereas some forms of procrastination are easily identifiable according to strict temporal criteria, others are less so and satisfy the delay criterion only indirectly. Interestingly, Lay (1986), defined procrastination as "the tendency to postpone that which is necessary to reach some goal" (p. 457), implying that procrastination does not refer to a single act of delay, but to a tendency demonstrated over time to delay goal-relevant acts. In effect, is seems to be important to recognize that procrastination is a dynamic phenomenon unfolding over time, manifesting itself in tendencies to act in ways that prove suboptimal in attaining goals. Such delays may result from explicit delays as well as be a by-product of maladaptive strategies in sustained goal-directed behavior. In both cases, the delays and strategies must be "irrational" or akratic for them to be regarded as procrastination.

1.2. How procrastination scales measure different goal phases

The procrastination literature is unclear on the various stages of intended goal realization, and so are scales attempting to measure procrastination. They do not distinguish between delays in getting started (onset delay, defined in terms of a temporal gap between intention formation and relevant goal-striving behavior) and failures in keeping goal pursuit on track (delays created in indirect ways during goal-striving). We examined 18 procrastination scales to determine their coverage of these implementation facets. Some scales include items that address delayed onset, as the DPS (item 2, "Even if I make a decision I delay acting upon it"), the GPS (item 1, "I often find myself performing tasks that I had intended to do days before"), and the Unintentional Procrastination Scale (UPS,(item 1, "I rarely begin tasks

[1] Note that goal phases corresponding to the two discussed are well documented in motivation research. For example, Lewin et al. (1944) posited two stages: Goal setting, where we deliberate and establish goals we will pursue, and goal striving. Later models contain these two or more. For example, Kruglanski et al. (2000) divide action orientation into two phases, an assessment phase, and a locomotion or doing mode. Kanfer (2012) made a very similar distinction. Diefendorff and Lord (2008) and O'Reilly et al. (2014) approached this issue from a neuroscience perspective. O'Reilly et al. attempted to establish the number of goal phases, and again suggested two primary phases: Goal selection, and goal engagement. These authors argued that these states have "strongly dissociable properties" (p. 4) and hence should be modeled separately.

Table 1
Procrastination items covering onset and sustained goal striving in existing scales.

1	I often find myself performing tasks that I had intended to do days before.	GPS	ONSET
9	I generally delay before starting on work I have to do.	GPS	ONSET
2	Even after I make a decision I delay acting upon it	DPS	ONSET
1	I delay starting things until the last minute.	API	ONSET
3	Even when I know a job needs to be done, I never want to start it right away.	API	ONSET
8	I delay starting things so long I don't get them done by the deadline.	API	ONSET
10	It often takes me a long time to get started on something.	API	ONSET
11	I don't delay when I know I really need to get the job done. (R)	API	ONSET
12	If I had an important project to do, I'd get started on it as quickly as possible. (R)	API	ONSET
15	I get right to work at jobs that need to be done. (R)	API	ONSET
1	I rarely begin tasks as soon as I am given them, even if I intend to.	UPS	ONSET
2	Allowed yourself to be distracted from your work	APSI	SUST
5	Drifted off into daydreams while studying	APSI	SUST
7	Experienced concentration problems when studying	APSI	SUST
8	Gave up when studying was not going well	APSI	SUST
10	Interrupted studying for a while in order to do other things	APSI	SUST
12	Gave up on studying early in order to do more pleasant things	APSI	SUST
14	Studied the subject matter that you had planned to do (R)	APSI	SUST
15	Felt, when studying, that you disliked the subject	APSI	SUST

Note. GPS = General Procrastination Scale; DPS = Decisional Procrastination Scale; AIP = Aitken Procrastination Inventory; APSI = Academic Procrastination State Inventory; UIP = Unintentional Procrastination Scale. Item numbers refer to item numbers in the original scales.

as soon as I am given them, even if I intend to;" Fernie et al, 2017). In contrast, very few scales address issues during goal-striving that may create unnecessary delay in more indirect ways. One exception is the Academic Procrastination State Inventory (APSI; Schouwenburg, 1995). The APSI asks respondents to indicate how "frequently last week did you engage in the following behaviors or thoughts," listing a number of examples related to disruption of goal striving (e.g., "Gave up studying because you did not feel well, " Drifted off into daydreams while studying," and "Experienced concentration problems when studying"). However, this scale also contains items not addressing sustained goal striving (e.g., "Forgot to prepare things for studying"). Items in this scale were intended to cover the three important facets of procrastination according to Schouwenburg, 1995, lack of immediacy in intentions and behavior, a discrepancy between intention and behavior, and a preference for competing activities, and were not intended to measure failure of goal striving per se (cf. also Patzelt & Opitz, 2014). Other scales may address procrastination during sustained goal striving but are ambiguous as to whether they also refer to onset delay. For example, the GPS item 12 "In preparation for some deadline, I often waste time by doing other things" may refer both to initiation and sustained goal striving. This ambiguity also applies to the two IPS items discussed (IPS 2, "If there is something I should do, I get to it before attending to lesser tasks" - R), and IPS 4, "When I should be doing one thing, I will do another").

Table 1 summarizes items from existing procrastination scales that address delays in onset and sustained goal striving[2]. As is seen from the table, we have found only one scale addressing delay during goal striving, and this scale is intended for use in academic settings.

Fig. 1 illustrates the phases of intended action, separating the implementation phase in onset versus sustained goal striving (cf. Sheeran & Webb, 2016). As is indicated in Fig. 2, procrastination in these phases may take different forms, and measuring them independently may be important. For example, delayed onset implies that effort during sustained goal striving must be increased if a task is to be completed within a fixed timeframe (e.g., Steel et al., 2018, Fig. 1). In this case, even though the onset and sustained action procrastination measures may be positively correlated, slow onset in high procrastinators predicts lower sustained procrastination because slow starters must catch up to finish in time. Another issue of interest is which of the two facets of procrastination – slow onset and delays in sustained goal striving – best

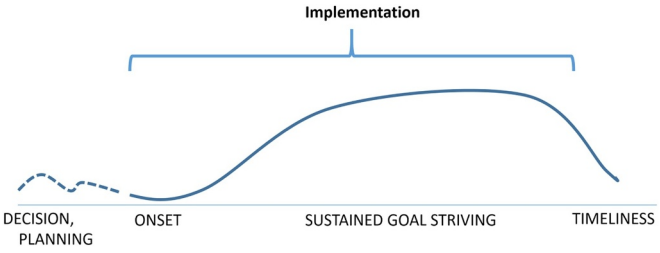

Fig. 1. Phases of intended action.

predict overall procrastination score. If, as suggested, delayed onset is compensated by increased effort during goal striving, one may suspect that onset delay is a main determinant of overall procrastination. Finally, as procrastination implies reduced time spent on important tasks (Lay, 1986; Tice et al., 2001), one may ask whether reduced time can be traced to late onset, to impulsive diversions during goal striving, or to both. Given the compensation hypothesis discussed, it is likely that onset delay may be the best predictor of reduced time spent on important tasks.

1.3. Conceptual framework for three facets of procrastination

1.3.1. Onset delay

As seen in Table 1, the GPS (Lay, 1986) contains two items addressing implemental delay, the DPS (Mann, 1982) one. Both items are included in the Pure Procrastination Scale (PPS; Steel, 2010; 6 and 8, from the GPS; 2 from the DPS). Furthermore, the Aitken Procrastination Inventory (API; Aitken, 1982) contains seven items explicitly addressing onset delay (e.g., "Even when I know a job needs to be done, I never want to start right away"; "It often takes me a long time to get started on something"). Finally, the Volitional Components Inventory / Volitional Components Questionnaire (VCI/VCQ (Kuhl & Fuhrmann, 1998) contains four items addressing swift action when action possibility presents itself, thus being inconsistent with delayed onset (e.g., "When something needs to be done I start without hesitating," "When a task needs to be done, I like to do it right away"). Most of these items address onset delay (or the opposite), but they generally fail to address two important features of procrastination, delay in the context of an explicit intention, and general delay versus procrastination. Hence, we slightly modified some items (marked in italics in Table 2) to reflect intentions and akratic delay. The authors discussed a

[2] A list of items (> 175) from 18 procrastination scales is available from the corresponding author.

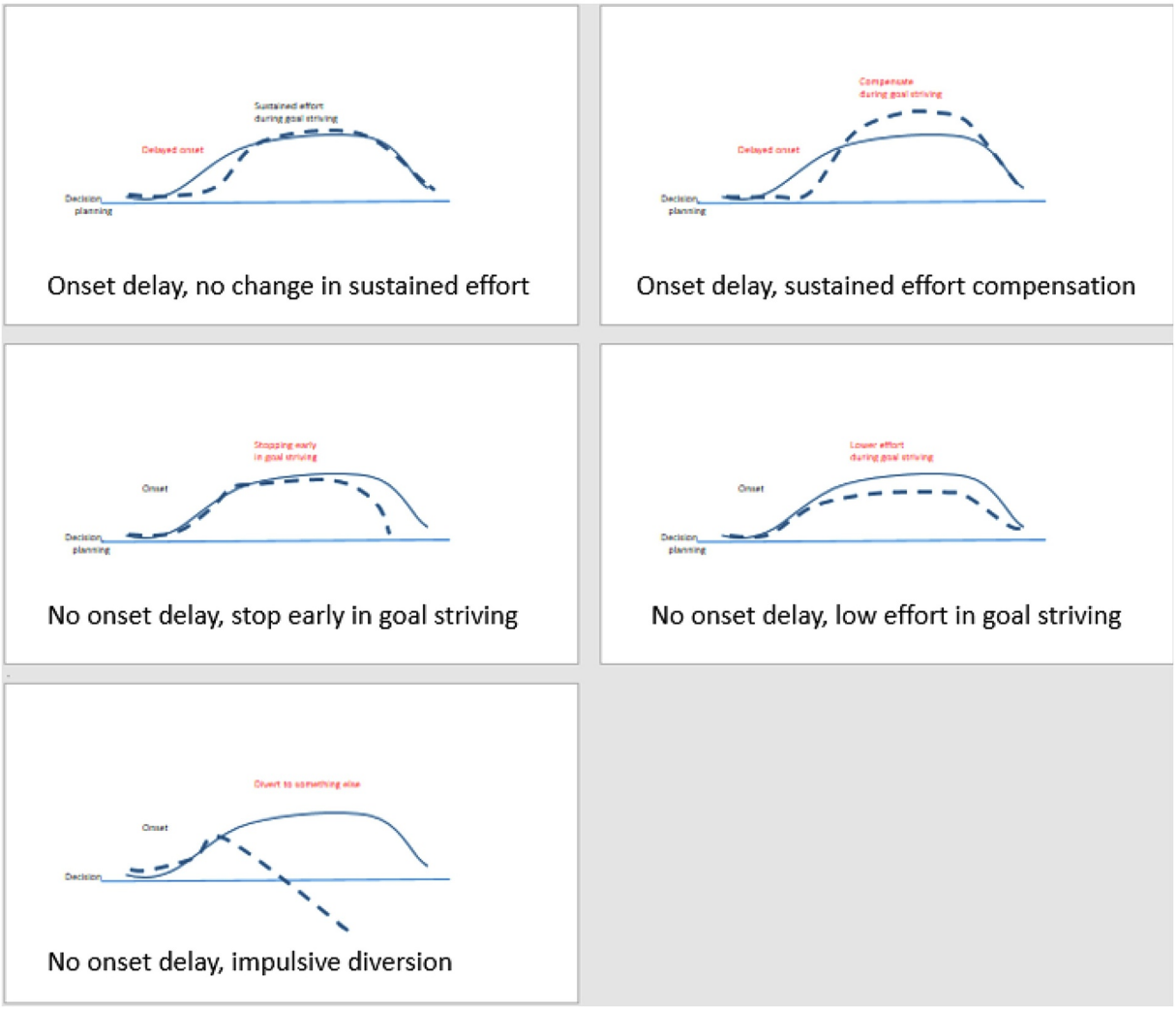

Fig. 2. Relations between onset and sustained action delay.

Table 2
Onset delay items used in this study.

1 Even after I make a decision I delay acting upon it	DPS / PPS
2 I generally delay before starting on work I have to do	GPS / PPS
3 I delay starting things until the last minute, *even when I intended to start earlier*	API / CUST
4 Often I start so late that I miss the deadline	API / CUST
5 Even after I have made a decision, I delay acting upon it *for no specific reason*	DPS /CUST
6 When I am to start tasks I planned to do, I often end up doing something else instead	CUST

Note. DPS = Decisional Procrastination Scale; PPS = Pure Procrastination Scale; GPS = General Procrastination Scale; API = Aitken Procrastination Inventory; CUST = Custom item (specific costumizations in italics).

pool of 18 possible items and selected, based on content analysis, six items for use (Table 2). The two first items are from the GPS (also used in the PPS) and may serve as a benchmark for the other onset items, as they have proven successful in numerous studies of implemental delays (e.g., Svartdal & Steel, 2017).

1.3.2. Sustained goal pursuit delay

As discussed, whereas onset delay primarily relates to a timing criterion ("I will start tomorrow, not today") or prioritizing ("I will do X rather than Y, even if both are possible"), sustained goal striving relates to commitment and having the necessary time, focus, and energy to implement intentions over time. For aversive and boring tasks, other alternatives become tempting, and especially so when one gets tired, and exhaustion may result if the task is demanding, also increasing the likelihood of being tempted to do other and more attractive things (Steel et al. 2018). Hence, procrastination in this action phase may relate to, among other things, tiredness, exhaustion, focus (being distracted), temptations, nature of task (difficult, boring), tasks decided by others, taking a break to escape for a while, give in after minor setbacks, dislike hard work, typically not finish tasks, change one's mind, and others (e.g., Schouwenburg, 1995). Table 3 lists the items selected for the present studies. All were custom made for this study, but several were inspired by items in the APSI scale (Schouwenburg, 1995).

1.3.3. Delay in reaching the intended goal

Finally, to cover the end of goal pursuit, we included items to

Table 3
Goal pursuit delay items used in this study.

1 When I work on important tasks, I often quit sooner than I should	CUST (APSI 12)
2 When working on tasks, I often have to force myself to continue	CUST
3 I cannot work on tasks for longer periods at a time	CUST (APSI 12)
4 I shift attention frequently away from the task I am working on	CUST (APSI 2, 7)
5 When working on a task, I find myself browsing and reading irrelevant sites	CUST
6 I am easily captured by other things – skip doing what I intended to do	CUST (APSI 10)
7 I can attend to other things (mail, FB, etc.) while doing academic work	CUST

Note. APSI = Academic Procrastination State Inventory. CUST = custom item. Custom items inspired by other scales indicated in parentheses.

Table 4
Delay in reaching intended goals items used in this study.

1 I get short of time	CUST
2 I cannot meet deadlines	CUST (AIP)
3 I am not very good at keeping deadlines	AIP
4 When I work on a task, I typically finish before others	CUST
5 I am often delayed	CUST
6 I lag behind on study work	CUST

Note. AIP = Adult Inventory of Procrastination Scale. CUST = custom item (one inspired by the AIP).

measure meeting deadlines and timeliness (Table 4). Appropriate items are found in existing scales, especially in the AIP; (McCown et al., 1989; Svartdal & Steel, 2017). We also added custom items.

1.4. The present studies

Study 1 assessed items purporting to measure different facets of procrastination (Tables 2–4) using exploratory factor analysis (EFA), both for item functioning as well as for factor structure, the overall expectation being that items would organize into a three-factor solution - *onset, sustained goal striving,* and *timeliness*. Study 2 further examined these items using confirmatory factor analysis (CFA), testing the factor structure as suggested by Study 1.

Having established measures of onset procrastination versus sustained goal striving procrastination, we compared these measures against a well-established procrastination scale, the Irrational Procrastination Scale (IPS; Steel, 2010). This scale correlates highly with other general procrastination scales (Svartdal & Steel, 2017, Table 7). We expected for these data that the three facets of procrastination would correlate moderately to highly with the IPS score, and – as discussed – that the onset subscale would demonstrate an especially close relationship to overall procrastination score.

Next, as delayed onset narrows the timeframe available for task completion, we examined the relations between the onset and sustained procrastination measures. Although these measures should correlate rather highly, a "compensation" hypothesis predicts that individuals delaying onset must work even harder to complete tasks in time. Hence, high procrastinators should demonstrate high onset procrastination scores but relatively lower scores on the sustained goal striving procrastination measure, whereas the opposite pattern should be observed in non-procrastinators.

In both studies, we also administered a simplified model of a typical task completion sequence based on the model presented in Fig. 1 and asked participants to indicate the perceived difficulty associated with each stage. Task difficulty is associated with procrastination (Steel, 2007), and this procedure therefore served as an independent measure of problems associated with the various phases of intended action. Here we expected that the onset phase would be especially prone to be perceived as difficult, and especially so with increasing overall procrastination score.

Finally, we measured self-reported time spent on self-directed academic work. An overall expectation is that procrastination limits the time available on a given project (Lay, 1986), suggesting a negative correlation between self-directed academic work and procrastination score. Note that direct and indirect delays have a common effect, as both limit the time available for goal-directed work. Separating onset delay and sustained goal striving delay may give an additional perspective to this picture, and again we expected onset delay to be particularly predictive of time spent on academic work.

2. Study 1

2.1. Method

2.1.1. Participants

The sample comprised 170 students aged 18 to 48, mean age = 25.56 ($SD = 5.47$). The majority of participants (85.7%) were females.

2.1.2. Procedure and ethics

Participants were recruited by circulating a survey on mailing lists and social media at several universities and high schools in Norway. All were informed that participation was voluntary and anonymous and that they could withdraw from the study at any time. Participants were given information about the purpose of the study together with a link to the online survey (www.qualtrics.com) and gave informed consent by pressing a "start the survey" button. The current project is a part of a larger project on procrastination, which has ethical approval from the Regional Ethical Board in Tromsø, Norway (REK nord 2014/2313).

2.1.3. Material

The item sets shown in Tables 3–5 were presented sequentially and rated on a 5-point Likert scale with higher scores indicating increasing agreement. Then the survey presented a simplified model of a typical task completion based on the model presented in Fig. 1 and asked participants to indicate, on a 1-5 scale, the perceived difficulty associated with each stage. Finally, all responded to the six-item version of the IPS (Svartdal & Steel, 2017). The original IPS (Steel, 2010) features nine items, of which three are reversed. In the six-item version, the reversed items are deleted. Both versions demonstrate good internal consistency, α = .85–.93, and the full and reduced versions correlate highly. All scale items are rated on a 5-point Likert scale, with higher scores indicating more procrastination.

2.1.4. Analysis

Exploratory factor analysis (EFA) was employed using principal axis factoring. An eigenvalue > 1 and the scree plot test were used to determine underlying factors. An oblique rotation (oblimin) was applied since the extracted factors were expected to be correlated. Analyses were performed in IBM SPSS statistics 25.

2.2. Results and discussion

The EFA was appropriate as indicated by a Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of above 0.906 and a highly significant Bartlett's Test of Sphericity ($p < 0.001$). The initial EFA analysis produced three underlying factors *onset, sustain*, and *timeliness*,

Table 5
Oblique (oblimin) rotated factor loadings.

Items	Onset	Sustain	Timeliness
1 Even after I make a decision I delay acting upon it	-0.746		
2 I generally delay before starting on work I have to do	-0.915		
3 I delay starting things until the last minute, *even when I intended to start earlier*	-0.759		
5 Even after I have made a decision, I delay acting upon it *for no specific reason*	-0.872		
1 When I work on important tasks, I often quit sooner than I should		0.634	
2 When working on tasks, I often have to force myself to continue		0.745	
3 I cannot work on tasks for longer periods at a time		0.762	
4 I shift attention frequently away from the task I am working on		0.886	
5 When working on a task, I find myself browsing and reading irrelevant sites		0.675	
6 I am easily captured by other things – skip doing what I intended to do	-0.255	0.583	
2 I cannot meet deadlines			0.675
3 I am not very good at keeping deadlines			0.883
5 I lam often delayed			0.438

Note: All loadings significant, $p < .01$. Coefficients <.15 are suppressed.

as indicated by eigenvalues above 1 (8.71, 1.89 and 1.50) and the scree plot, confirming our overall expectation of the factor structure.

Six items were reexamined based on low factor loadings and/or double loadings, resulting in deletion: Onset items 4 ("Often I start so late that I miss the deadline") and 6 ("When I am to start tasks I planned to do, I often end up doing something else instead") demonstrated double loadings on the onset and timeliness subscales. Sustain item 7 ("I can work on other things (check mail, FB, and so on) while doing academic work") was deleted due to low factor loading. The timeliness item 1 ("I get short of time") produced a double loading on onset and timeliness subscales. Item 5, suggested to measure timeliness ("When I work on an assignment, I typically finish before others"), loaded mainly on onset. Finally, "I lag behind on study work" produced a double loading on onset and timeliness.

We then repeated the EFA with the 13 items retained. Again, three factors with eigenvalues > 1 (5.86, 1.63, and 1.42) appeared, accounting for 68.5% of the variance. The oblimin rotated loadings for each of the retained items are reported in Table 5. In conclusion, these data support a three-factor model, separating the two implemental facets onset and sustained goal striving, as well as confirming that timeliness is a separate facet of procrastination (e.g., Svartdal & Steel, 2017).

Table 6 presents means and correlations between the three subscales, the IPS, and difficulty ratings of the action phases. As expected, the onset subscale correlated highly ($r = .80$), with the IPS, whereas correlations were lower for the other subscales.

To assess the relation between the onset and sustained procrastination scores to general procrastination, a regression with IPS score as the dependent variable and subscale scores as predictors indicated that only onset scores significantly predicted IPS score, $\beta = .70$ ($p < .001$), whereas the sustained and timeliness subscales did not, $\beta = .12$ and $\beta = .10$, respectively. Hence, onset procrastination seems to be the better predictor of general procrastination, consistent with it being the first factor extracted.

Table 6
Descriptive data and correlations for the onset, sustained, and timeliness subscales, the IPS, as well as the difficulty ratings of the action phases.

	M	*SD*	1	2	3	4	5	6	7
1. ONSET	2.91	.99	1						
2. SUSTAIN	2.94	.85	.53	1					
3. TIMELINESS	1.65	.71	.40	.40	1				
4. IPS	3.17	1.02	.80	.54	.43	1			
5. STAGE1	2.68	1.05	.34	38	.08 *ns*	.36	1		
6. STAGE2	3.43	1.10	.67	.49	.31	.66	.41	1	
7. STAGE3	2.77	0.98	.41	.67	.30	.48	.27	.40	1
8. STAGE4	2.54	1.12	.43	.42	.38	.53	.21	.36	.50

Note: All correlations significant, $p < .01$; *M* = Mean; *SD* = Standard deviation; IPS = Irrational Procrastination Scale.

To further assess the relation between the two facet measures and general procrastination, we performed an ANOVA with the procrastination facets as dependent variables and IPS levels (IPS levels 1-5 as defined by the individual's absolute IPS score) as a categorical predictor. As argued, the expectation for these data was that both onset and sustained scores should increase with increased levels of general procrastination, but that this change would be especially pronounced in the onset measure and less so in the sustained measure. The ANOVA indicated an overall significant effect, $F(4, 164) = 53.70$, $p < .001$, $\eta^2 = .57$, reflecting that both facet scores increased with increasing IPS levels. Importantly, the interaction effect was significant, $F(4, 164) = 7.40$, $p < .001$, $\eta^2 = .15$, indicating that onset problems escalated more than sustained goal striving problems over increasing general procrastination levels. These results are displayed in Fig. 3 (left panel). Note in this figure also that timeliness scores increase only modestly over increasing IPS levels, and whereas overall onset and sustained procrastination means were quite similar (2.74 and 2.83), the overall timeliness mean was significantly lower (1.63), $F(2, 328) = 135.06$, $p < .001$, $\eta^2 = .54$.

Fig. 3 (right panel) shows the mean problem ratings for the four task completion phases over different procrastination levels. Difficulty ratings increased with increasing procrastination levels, $F(4, 163) = 32.38$, $p < .001$, $\eta^2 = .44$. In addition, the phase * procrastination level interaction was significant, $F(12, 489) = 2.10$, $p = .015$, $\eta^2 = .05$, reflecting that onset scores were especially sensitive to overall procrastination levels. Table 6 displays the correlations between the mean onset, sustained, and procrastination scores and action phase difficulty ratings. Notably, both the onset and sustained procrastination scores correlated highly, $r = .67$, with their corresponding difficulty ratings in the onset and sustained action phases.

Finally, the relation between time spent on self-directed academic work and procrastination score (IPS) was negative, $r_S = -.33$. The onset score correlated somewhat higher with academic work, $r_S = -.38$, the sustained lower, $r_S = -.22$, indicating again that onset problems contribute more to reduced time available for academic work.

3. Study 2

Study 2 was performed as replication of Study 1, allowing for the use of CFA on a sufficiently large independent sample.

3.1. Method

3.1.1. Participants

The sample comprised 295 students between the ages of 19 to 55, mean age = 26.28 (*SD* = 7.56) years. The majority of participants (82%) were females.

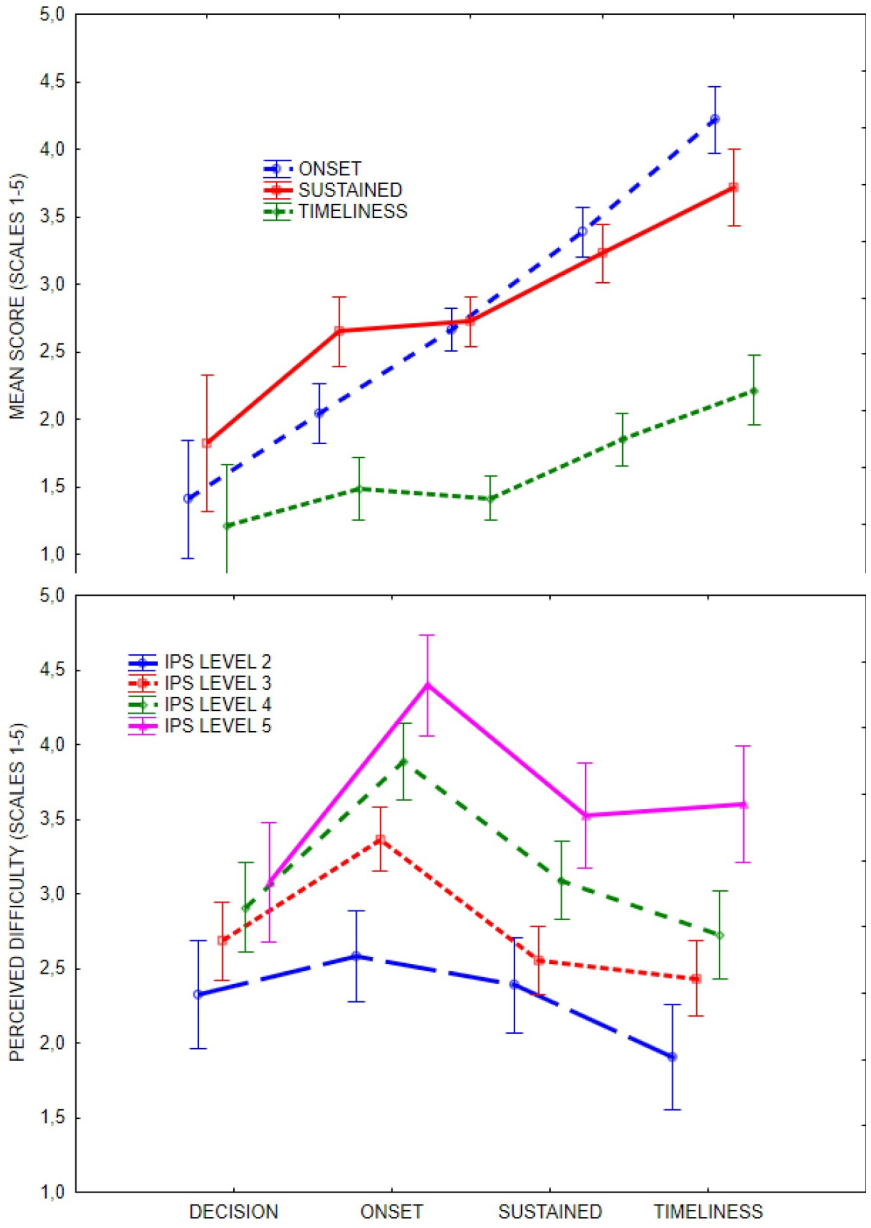

Fig. 3. Subscale ratings over different levels of IPS levels (left panel); Difficulty ratings over the four planned action phases over different IPS levels (right panel).

3.1.2. Procedure and ethics

Participants were recruited by circulating the survey by email and on social media using assistants at several universities throughout Norway. See Study 1 for procedure and ethics information.

3.1.3. Material

The material was identical to that of Study 1, except that the timeliness item 2 was not included in the data collection[3]. Hence, only two items were specified as indicators of the timeliness factor. The onset and sustain factors had four and six indicators, respectively, corresponding to those used in Study 1.

3.1.4. Analysis

CFA was employed using two estimators, robust maximum likelihood estimation (MLR) due to deviation from normality, and robust weighted least square (WLSMv) that is appropriate for ordinal data and relatively smaller samples (Kline, 2016, p. 326). Model fit to data was examined using standard fit indices (Brown, 2015), specifically the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root-mean-square error of approximation (RMSEA), and standardized root-mean-square residual (SRMR). An RMSEA less than 0.05, CFI and TLI values greater than 0.95, and SRMR less than 0.05 represent a well-fitting model. RMSEA as high as .08 indicates a reasonable fit, whereas RMSEA values ranging from .08 to .10 indicate mediocre fit and estimates above .10 indicate poor fit (Browne & Cudek, 1993; MacCallum et al., 1996). In evaluating the models, we conducted chi-square difference tests. When conducting chi-square difference tests using the MLR estimator, it is necessary to adjust the chi-square using the Satorra-Bentler scaling correction (for details, see Bryant & Satorra, 2012). When using the estimator for categorical data (i.e., WLSMV), the difference test procedure using chi-square is applied (for details, see Asparouhov & Muthén, 2010). Analyses were performed with Mplus version 8.3.

[3] We decided, prior to data collection for Study 2 and prior to data analyses of Study 1, not to include item 2 because of overlap with item 4.

3.2. Results and discussion

First, the fit of a three-factor model was compared to a single-factor model. As seen in Table 1 (Appendix), the single-factor model produced a poor fit across estimators. The three-factor model had a good fit with the WLSMv considering CFI > .95, TLI > .95, and SRMR < .05, and a mediocre fit considering RMSEA = 0.087, whereas MLR produced reasonable fit (i.e., CFI > .90, TLI > .90, SRMR = .052) and mediocre fit (i.e., RMSEA = 0.082). The chi-square difference tests indicated support for the three-factor model (WLSMv Chi-square difference = 209.986, df = 3, $p < 0.001$; MLR Chi-square difference 250.361, df = 3, $p < 0.001$). Second, based on modification indices, errors of sustain items 1 and 4 were correlated with sustain item 2 and 3, and sustain item 2 was correlated with sustain item 3. In both cases, these steps were reasonable, as these items demonstrate considerable overlap in meaning. Both the single-factor and three-factor models were modified, resulting in a well-fitting three-factor model and a poor-fitting single-factor model with both estimators. Again, a chi-square difference test was employed yielding support for the three-factor model (i.e., WLSMv: chi-square diff = 192.973, df = 3, $p < 0.001$; MLR chi-square diff = 197.566, df = 3, $p < 0.001$). Finally, an alternative model with sustain item 3 removed (because of high similarity to sustain item 2) produced an even better fit using both estimators (see Table 1, Appendix). Again, based on modification indices using both estimators, errors of sustain item 3 was correlated with sustain item 1 and 5. This modified model produced excellent fit with the WLSMv (χ^2 = 53.77, df = 39, $p = 0.058$; CFI = 0.997; TLI = 0.995; RMSEA = 0.025, and SRMR = 0.025) and with the MLR (χ^2 = 41.61, df = 39, $p = 0.358$; CFI = 0.998; TLI = 0.997; RMSEA = 0.016 and SRMR = 0.029). Thus, the CFA confirmed the results of Study 1 supporting a three-factor model. The result of the CFA (MLR) is presented in Fig. 4 (left panel).

As noted, in Study 1 only onset score significantly predicted overall procrastination score (IPS). Fig. 4 (right panel) displays the corresponding analysis for the present study, using SEM to model how the three subscales predict IPS score. The model demonstrated a good fit, CFI = 0.974; TIL = 0.968; RMSEA = 0.041(90%CI 0.033 – 0.058); SRMR = 0.041. As is seen from the figure, onset significantly predicted IPS score, β = .68, whereas the two other subscales demonstrated substantially lower but still significant beta values, β = .18 (sustain) and .16 (timeliness).

Table 7 presents means and correlations between the three subscales and the IPS. The results were similar to those of Study 1, the onset subscale correlating highly (r = .80) with IPS, and lower correlations for the other subscales.

The relation between the facet measures and general procrastination demonstrated similar patterns as those observed in Study 1. First, the ANOVA indicated an overall significant effect of the onset and sustained procrastination facets over increasing levels of IPS, $F(4, 223) = 69.99$, $p < .001$, $\eta^2 = .56$. Second, as in Study 1, the onset * sustained interaction was significant, $F(4, 223) = 6.78$, $p < .001$, $\eta^2 = .11$, reflecting that onset problems escalated more than sustained goal striving problems over increasing general procrastination levels. These results are displayed in Fig. 5 (left panel).[4] The timeliness scores increased over increasing IPS levels, but levels were lower compared to the onset and sustained procrastination scores. Overall onset and sustained procrastination means were quite similar (2.86 and 2.92), whereas the overall timeliness mean was significantly lower (2.43), $F(2, 446) = 18.13$, $p < .001$, $\eta^2 = .08$.

The problem ratings for the four task completion phases over different procrastination levels demonstrated similar results as those of Study 1, see Fig. 5, right panel. First, difficulty scores increased with increasing procrastination levels, $F(3, 223) = 44.49$, $p < .001$, $\eta^2 = .37$. Second, the phase * procrastination level interaction was significant, $F(9, 669) = 5.70$, $p < .001$, $\eta^2 = .07$, demonstrating that onset scores were especially prone to increase as a function of general procrastination (IPS) levels.

The relation between time spent on self-directed academic work and IPS score was negative, r_S = -.28. Again, the onset score correlated somewhat higher with academic work time, r_S = -.40, the sustained lower, r_S = -.18, indicating that onset problems contribute more to reduced time available for academic work.

4. General discussion

The distinction between delayed onset and disruptions during goal-striving is well established (e.g., Sheeran & Webb, 2016). Whereas the first primarily relates to timing and manifests itself directly in terms of later onset, delay in sustained goal striving occurs in a variety of direct and indirect ways. Thus, while delayed onset may address the prototypical instance of procrastination, the Latin *procrastinus* literally referring to something "belonging to tomorrow," failure to stay on track toward a goal may be rooted in a variety of disruptive factors, indirectly creating delay in goal striving. The latter facet of procrastination is rarely addressed in procrastination research, nor in scale construction. The lack of procrastination scales to address both facets of implemental procrastination is unfortunate, even more so because this circumstance reflects an insufficient understanding of the phenomenon in procrastination literature. The present paper attempted to theoretically differentiate the two facets and to present a scale to measure them. The scale proposed in the present paper explicitly addresses two phases of task implementation, onset and continued goal striving.

Results of Study 1 suggested a three-factor structure corresponding to the suggested constructs *onset delay, delay during goal striving*, and *timeliness*. The onset delay measure correlated highly with a standard measure of general procrastination (IPS; Steel, 2010), whereas the two other measures demonstrated lower correlations with the IPS. Study 2 replicated the first study with a larger sample, allowing for a specific test using CFA of the factor structure. The results confirmed the three-factor solution identified in Study 1. Correlational analyses repeated the findings from Study 1, with a high correlation between the IPS and the onset delay measure, and lower correlations with the sustained goal striving and timeliness measures.

Both studies indicate support for the specific role of onset delay in procrastination. Specifically, an analysis of the relations between the three subscales over different levels of procrastination (as measured by the IPS) demonstrated that the onset delay means were lower relative to the sustained means for lower levels of procrastination, whereas for higher levels of IPS the levels reversed. This shift indicates that onset delay becomes an increasingly important problem as overall procrastination tendencies increase. These results were supported by an independent measure of perceived difficulties associated with the typical phases of planned action, decision, getting started, keeping up sustained action, and finishing in time. Again, onset was identified as the most problematic phase, and especially so by high procrastinators. Finally, self-reported time spent on self-directed academic work was correlated with general procrastination score, but higher so with the onset procrastination measure. In essence, the German saying "Aller Anfang ist schwer" ("Every beginning is hard") and the Norwegian expression "dørstokkmila"("the doorstep mile") get a deeper meaning according to these data, as starting something may be hard for everyone, and is even harder as overall procrastination tendency increases.

As delayed onset narrows the timeframe available for task completion, but many tasks have a fixed time frame for completion, the present data indicate that late onset may be compensated by increased effort during the sustained goal striving phase. However, working harder under stricter time regimes fosters stress and suboptimal conditions for work, which, in turn, probably lead to lower academic achievement if, at all, the task is completed.

[4] In Fig. 5, eight individuals at IPS level 1 were moved to level 2.

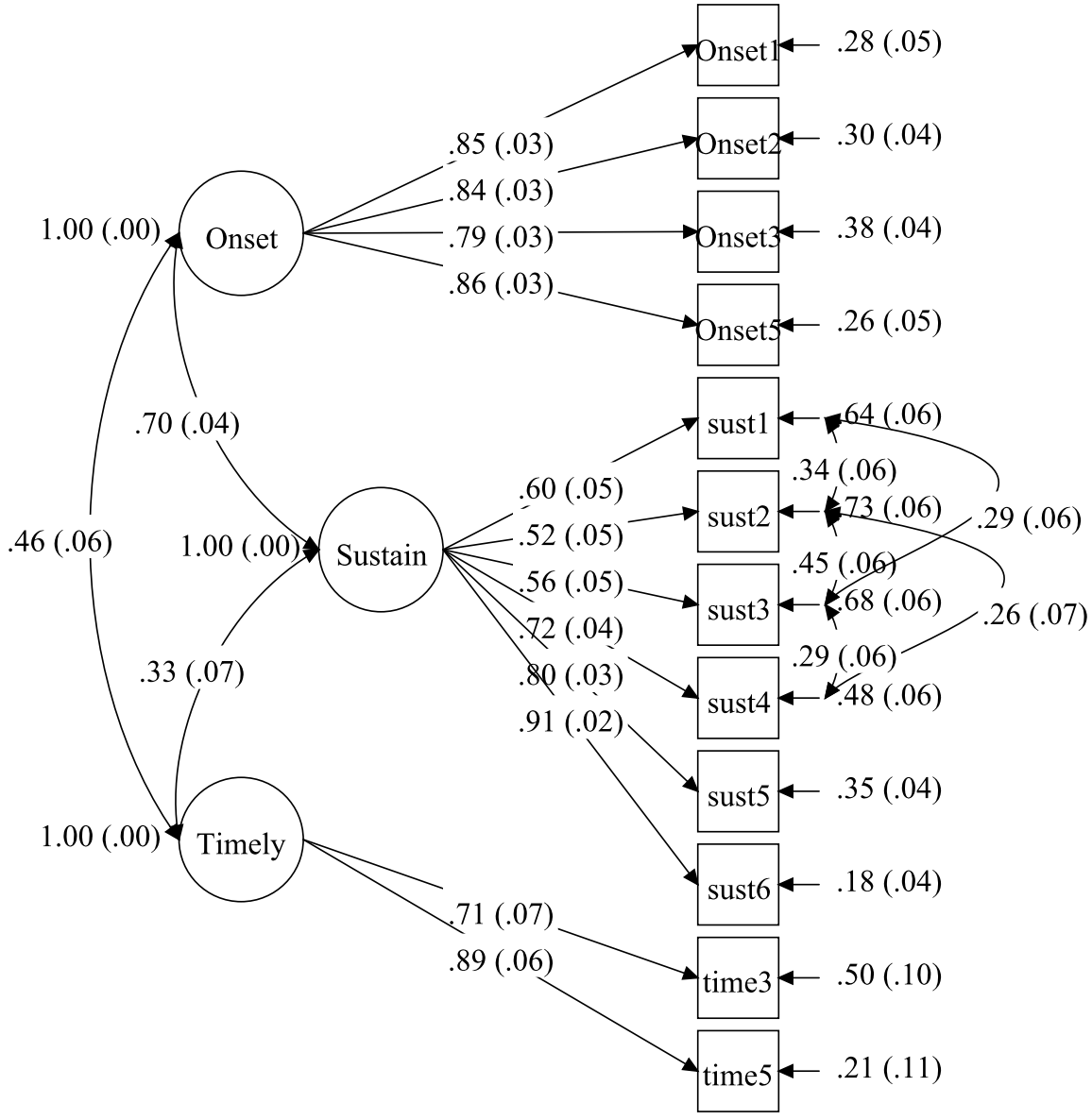

Fig. 4. CFA - standardized estimates; Model for subscales predicting IPS, standardized estimates .

4.1. Limitations and future research

Our results indicate that onset delay is particularly important in procrastination, but an alternative interpretation is that procrastination during goal-striving is more difficult to monitor and hence to report and measure. Specifically, onset delay is a construct addressing timing, given an intention to act. Even if there may be various specific reasons for delaying onset (e.g., indecision about means, second thoughts), the result as perceived by the actor is a failure to start as intended. In contrast, delays during task execution may be due to diverse and complex factors that work indirectly to create delay. For example, low willpower can make situational temptations appear attractive, causing impulsive diversions from planned action (e.g., Steel et al., 2018). Although such diversions are themselves detectable, delays in task execution because of them may not be equally obvious to the individual. Hence, as we are notoriously poor at monitoring ourselves attentively when we attempt to self-regulate (Baumeister & Heatherton, 1996), delays during task pursuit may be more difficult to self-report. Furthermore, the fact that delayed onset often makes it necessary to increase goal striving effort to catch up may indicate to procrastinators that they work as hard as, or even harder, compared to others, even to non-procrastinators. Future research should assess these issues, also in situations that are not compromised by differences in onset (e.g., in controlled situations examining disruptions in goal striving with no differences between participants in onset delay, cf. Tice et al., 2001, Experiment 3).

Turning to the limitations of the study, the sample size used in Study 1 is quite small. However, the factor loadings are generally high (i.e., loadings ranging from .44 to .91). Studies have shown that moderate to high loadings was the major factor in determining reproducibility (Guadagnoli & Velicer, 1988; Tabachnick & Fidell, 2013). For instance, Guadagnoli and Velicer (1988) suggested that a sample size of $N \geq 100$ was sufficient if four or more variables per factor had loadings above .60. Further, the present research is based on two student samples, suggesting that future studies should assess factor structure as well as relations between onset delay and delay in sustained goal striving in samples from the general population as well. Such studies should also assess scale properties over gender, age, and even cultures (e.g., Kankaraš & Moors, 2010).

Items used to assess sustained goal striving were inspired by the work of Schouwenburg, 1995, and would profit from scrutiny and possibly adding other items. In this respect, a limitation in Study 2 is

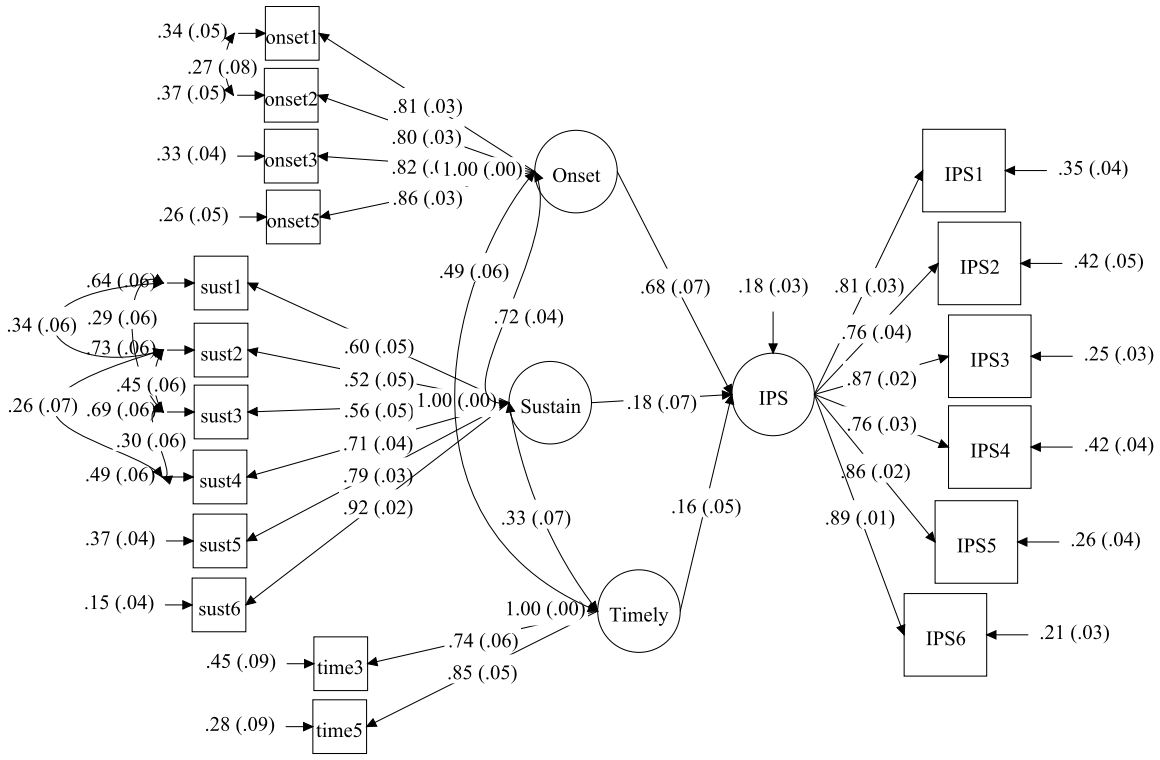

Fig. 4. (*continued*)

Table 7
Descriptive data and correlations for the onset, sustained, and timeliness subscales, the IPS, as well as the difficulty ratings of action phases.

	M	*SD*	1	2	3	4	5	6	7
1. ONSET	2.87	1.03	1						
2. SUSTAIN	2.95	.86	.57	1					
3. TIMEL.	2.41	.92	.44	.42	1				
4. IPS	2.99	.97	.80	.60	.58	1			
5. STAGE1	2.52	1.07	.26	.31	.34	.34	1		
6. STAGE2	3.29	1.07	.66	.46	.44	.70	.28	1	
7. STAGE3	2.60	.96	.40	.62	.36	.43	.25	.32	1
8. STAGE4	2.29	1.05	.28	.40	.41	.37	.27	.26	.49

Note: All correlations sig. at $p < .01$; *M* = Mean; *SD* = Standard deviation; IPS = Irrational Procrastination Scale.

the post-hoc modification to improve the CFA model fit indices. Several measurement errors were allowed to correlate among indicators of the sustain-subscale, which, as pointed out by Hermida (2015), moves the model testing from being confirmatory to becoming an exploratory analysis. Error correlations are likely due to sampling error, which may restrict cross-validation of the structure in future studies (Hermida, 2015; Grant, 1996). Further, the underlying structure may be masked if a relevant omitted variable is estimated through measurement error (Cortina, 2002; Landis, Edwards, & Cortins, 2009). However, the model fit of the non-modified three-factor model was generally in the range of an acceptable fitting model. In particular, the alternative three-factor model (Appendix, Table 1) produced a good fit to the data. This again suggests that items would profit from scrutiny and potentially adding other items, and future research should address

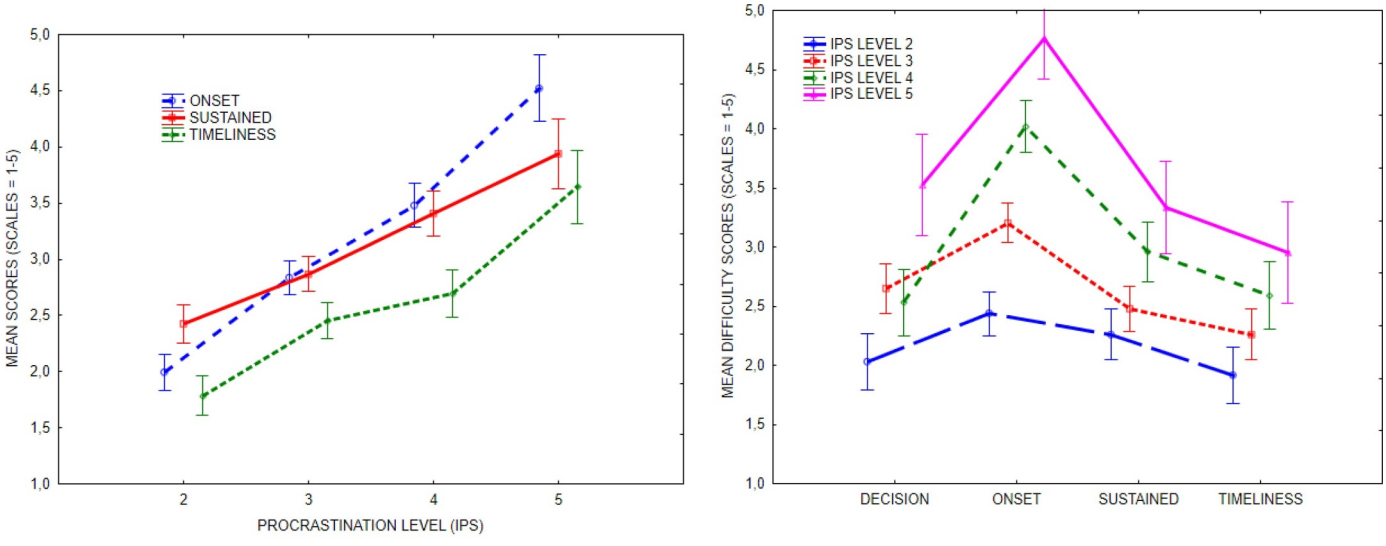

Fig. 5. Subscale ratings over different levels of IPS levels (left panel); Difficulty ratings over the four task completion phases over different IPS levels (right panel).

cross-validation and replication.

Another limitation of the present research is that we have utilized only one general procrastination scale, the IPS (Steel, 2010), as a reference. Other scales may demonstrate different relations to the subscales discussed in the present paper, even more so because different scales focus on different facets of procrastination. Hence, future studies should include other procrastination scales to verify the close relation observed between overall procrastination and onset procrastination, and the relatively weak relation between overall procrastination and procrastination in the goal-striving phase.

Another important step in validating the differentiation between onset procrastination and procrastination in the goal-striving phase is to investigate whether the two facets relate differently to motivational and volitional variables. As noted, the motivational forces operating during the beginning of goal pursuit are not necessarily the same as those important during later goal striving (Steel & Weinhardt, 2018). Thus, motivational variables, such as expectancies and values, should be related strongly to onset procrastination, whereas volitional variables, such as the ability to shield distractions or willpower in general, should relate more strongly to procrastination in the goal-striving phase. In a future study, we will relate the scale of the two facets to instruments measuring the different forms of motivation (as in the Self-Determination Theory; Deci & Ryan, 2008), strategies of regulation of motivation (Grunschel, Schwinger, Steinmayr & Fries, 2016), volition (Kuhl, 1984), and energy (Steel et al., 2018).

Appendix. Table 1.

Model fit for 1-factor and 3-factor models using MLR and WLSMv estimators (Study 2)

	Not modified 1-factor (MLR)	With modification[a] 1-factor (MLR)	Not modified 3-factor (MLR)	With modification[a] 3-factor (MLR)	Not modified Alternative 3-factor (MLR)	With modification[b] Alternative 3-factor (MLR)
χ^2	493.187, df = 54, $p < 0.001$	317.778, df = 49, $p < 0.001$	139.855, df = 51, $p < 0.001$	62.72, df = 46, $p = 0.051$	76.278, df = 41, $p < 0.001$	41.606, df = 39, $p < 0.358$
CFI	0.695	0.749	0.938	0.988	0.972	0.998
TLI	0.627	0.818	0.920	0.983	0.963	0.997
RMSEA	0.174 (90%CI 0.160 - 0.188)	0.143 (90%CI 0.128 0.158)	0.080 (90%CI 0.065 - 0.096)	0.037 (90%CI 0.000 - 0.058)	0.056 (90%CI 0.036 - 0.076)	0.016 (90%CI 0.000 - 0.046)
SRMR	0.108	0.094	0.052	0.034	0.029	0.029
	1-Factor (WLSMv)	1-Factor (WLSMv)	3-factor (WLSMv)	3-factor (WLSMv)	Alternative 3-factor (WLSMv)	Alternative 3-factor (WLSMv)
χ^2	708.088, df = 54, $p < 0.001$	565.481, df = 49, $p < 0.001$	154.470, df = 51, $p < 0.001$	70.987, df = 46, $p = 0.011$	93.316, df = 41, $p < 0.001$	53.774, df = 39, $p = 0.058$
CFI	0.845	0.877	0.975	0.994	0.988	0.997
TLI	0.810	0.835	0.968	0.991	0.984	0.995
RMSEA	0.212 (90%CI 0.198 - 0.226)	0.198 (90%CI 0.183 - 0.212)	0.087 (90%CI 0.071 - 0.103)	0.045 (90%CI 0.022 - 0.065)	0.069 (90%CI 0.050 - 0.087)	0.037 (90%CI 0.000 - 0.060)
SRMR	0.104	0.088	0.045	0.029	0.033	0.025

Notes. [a] include error correlations sustain-item 4 with sustain-items:1,3, 5 and sustain 3 with sustain-items 1, 5. [b] include error correlations sustain-item 3 with sustain-items 1 and 5. MLR = Robust maximum likelihood; WLSMv = Mean- and variance-adjusted weighted least squares; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root-mean square error of approximation; SRMR = standardized root-mean square residual.

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