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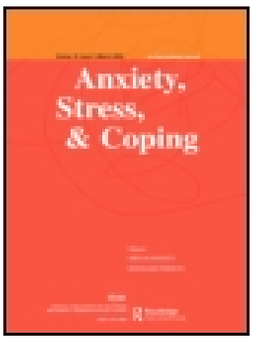

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Situation selection and modification in social inhibition: a person-centered approach

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ABSTRACT

Objectives: The current study aimed to identify patterns of situation selection and modification behaviors using a person-centered approach, and to examine to what extent the trait social inhibition (SI) is associated with these patterns of situation-targeted emotion regulation.

Methods: The sample comprised 504 participants ($M_{age} = 21.5$, $SD = 8.2$; 82% women), who completed questionnaires on situation selection and modification behaviors, and the social inhibition questionnaire (SIQ15). A three-step latent profile analysis (LPA) was performed to (A) identify existing latent profiles of situation avoidance and approach and situation modification behaviors, and (B) to examine the association of SI and facets with the latent class posteriors.

Results: LPA revealed the presence of four profiles that differed in how situation selection and modification were applied. SI, behavioral inhibition, and social withdrawal were significantly associated with a higher odds of belonging to the profile characterized by avoidance selection and modification. Interpersonal sensitivity was associated with using more conversational modification behaviors, which may illustrate that interpersonal sensitive individuals are motivated to approach, but use avoidance behaviors to prevent confrontation.

Conclusions: SI individuals particularly rely on avoidance selection and modification behaviors, which may be considered maladaptive emotion regulation.

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Social inhibition; situation selection; situation modification; emotion regulation; interpersonal sensitivity; social withdrawal

Introduction

We routinely make choices to approach or avoid situations based on how we think those situations will make us feel. In general, people will choose to approach situations that they evaluate as beneficial. They will behave in such a way that optimizes feeling at ease in that situation (Eldesouky & English, 2019; Livingstone & Isaacowitz, 2015), so that they benefit our social and emotional well-being (Gross, 2002). Selecting and modifying situations to maximize our well-being has been an integral part of emotion regulation theory (Gross, 2015; Larsen, 2000; Thayer et al., 1994). However, in comparison with reappraisal and suppression, situation selection and modification have received less attention (Webb, Miles, et al., 2012). Little is known on individual differences in the employment of these situation regulation strategies, while it is important to shed light on the potentially differential functions of the various strategies. Therefore, the current study examines within-person

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profiles of the situation regulation strategies people tend to use in concert, as well as how the personality trait social inhibition may explain differences among people in strategy use.

In one of the most widely used frameworks of emotion regulation, i.e., the process model of emotion regulation (Gross, 1998, 2015), *situation selection* is described as choosing situations that make it more (or less) likely that one will experience desirable (or undesirable) emotions. It involves selecting situations that might improve one's mood, but also avoiding situations that might increase negative mood (Livingstone & Isaacowitz, 2015; Sands & Isaacowitz, 2017; Vujovic & Urry, 2018; Webb et al., 2018). For example, arranging to meet with a friend for dinner after a difficult day at work to help put you in a better mood. To date, several lab studies have tested the effects of situation selection on emotional status. Their results indicate that situation selection (i.e., avoidance of the entire situation) is effective in downregulating negative emotions (Livingstone & Isaacowitz, 2015; Sands & Isaacowitz, 2017; Thuillard & Dan-Glauser, 2017; Vujovic & Urry, 2018), especially in individuals who have difficulty regulating their emotions otherwise (Webb et al., 2018). *Situation modification* refers to behaviors that modify the aspects of a situation to influence which emotions will or will not occur (Gross, 2015). For instance, a person may start making jokes in an effort to feel less uncomfortable in the situation he/she is in. Only one study to date has tested situation modification by giving participants the option to partially avoid vs. to use the cognitive regulation strategy reappraisal (Van Bockstaele et al., 2020). While both strategies were effective in downregulating negative emotions, the intensity of the situation determined the preferred strategy, i.e., in high intensity stress situations, participants preferred to use situation modification, i.e., avoidance, while in lower intensity stress situations, reappraisal was the preferred choice. Additionally, the degree to which a person can influence the outcome of a situation, i.e., controllability, affects the chosen regulation strategy and how effective it is in downregulating negative emotions (Troy et al., 2013). This preliminary body of work thus suggests that both situation selection and modification by partial avoidance may improve well-being and that situational context like the intensity (Van Bockstaele et al., 2020) or controllability (Troy et al., 2013) may play an important role in moderating the preferred strategy to use.

Besides the situational context, personality may also affect preference for choosing an emotion regulation strategy. Emotion regulation is bound to situational demands, and an individual's appraisal of those demands, and mostly occurs within a social context (Hofmann, 2014). It is therefore not surprising that some individuals may engage in maladaptive emotion regulation due to the anxiety they experience in social situations (Jazaieri et al., 2015). Social inhibition is a personality trait that describes individuals who experience difficulties in making contact with others (behavioral inhibition), are afraid of negative responses from others (interpersonal sensitivity), and tend to avoid social situations (social withdrawal; Denollet & Duijndam, 2019). Social inhibition may be related to maladaptive situation regulation, because of their unease in social situations (Kupper & Denollet, 2014; Pelle et al., 2010). Socially inhibited individuals may employ situation avoidance when social interaction is expected, or use safety behaviors (i.e., situation modifiers) such as looking away, or staying in the background (Salkovskis, 1991), to decrease the level of threat and anxiety in a social situation. These behaviors are common in anxiety disorders and avoidant personality disorder, and are involved in the development and maintenance of these disorders (Goetz et al., 2016; Helbig-Lang & Petermann, 2010; Lampe & Malhi, 2018; Pittig et al., 2015). However, social inhibition is a personality trait rather than a disorder, and thus far, it is unknown to what extent socially inhibited individuals engage in modification behaviors when regulating emotion, and which (combination of) behaviors are more prevalent than others.

Research on emotion regulation is predominantly variable-centered, meaning that it examines how emotion regulation variables relate to each other or contribute to a specific outcome (Laursen & Hoff, 2006). This assumes that samples are homogeneous and do not capture the individual differences in the breadth of the situation selection and modification behavior repertoire. Person-centered analysis on the other hand examines profiles of variables within a person and patterns of these profiles within populations (Laursen & Hoff, 2006). Research on emotion regulation processes

has started to implement person-centered approaches, primarily to identify distinct groups differentiated by the frequency of employment of a range of emotion regulation strategies (e.g., Chesney et al., 2019; Dixon-Gordon et al., 2015; Eftekhari et al., 2009). Importantly, the notion that individuals often use multiple regulation strategies within one emotional episode, in an ongoing sequence of different regulation and behavioral strategies, i.e., *polyregulation* (Ford et al., 2019), may better account for how emotion regulation unfolds in everyday life and could be identified using a person-centered approach. Profiles of later regulation processes are relatively well-identified, but profiles of situation-targeted emotion regulation strategies and behaviors, such as situation selection and modification, thus far have not been investigated. Situation selection and modification share underlying conceptual entities (Gross, 2015; Gross & Thompson, 2007), but it is unknown if distinct profiles across these entities exist, and how these profiles may relate to personality traits such as social inhibition. By taking into account the dynamic interactions between the person and the available emotion regulation strategies, we are able to identify which strategies are used in the context of other strategies. This enables us to identify which combinations of regulatory strategies may be adaptive or maladaptive, and who is more or less likely to employ such combinations of strategies.

The current study therefore first aimed to identify patterns of situation selection and situation modification, using a person-centered approach. Second, we examined how social inhibition is related to these profiles. Because socially inhibited individuals tend to avoid social situations (Denollet, 2013), we expect social inhibition to fit within a more avoidant style of situational emotion regulation. Given the multi-faceted nature of social inhibition (Denollet & Duijndam, 2019), and because prior research on social inhibition and emotion regulation revealed important differences between facets of social inhibition (Duijndam, Karreman, et al., 2020), we also examined how the underlying manifestations (behavioral inhibition (e.g., difficulty talking to other people), interpersonal sensitivity (e.g., social-evaluative concerns), and social withdrawal (e.g., avoidance of social interaction)) of social inhibition are related to the situation regulation profiles. We expect behavioral inhibition and social withdrawal to be mostly associated with avoidant emotion regulation (Denollet & Duijndam, 2019), and interpersonal sensitivity to also be related to an approach selection and modification, due to an approach-avoidance conflict (i.e., motivated to approach others, but at the same time being concerned about possible negative reactions from others) (Asendorpf, 1990; Goetz et al., 2016).

Method

Participants and procedure

The sample consisted of participants from two different datasets. The first sample comprised 159 undergraduate Psychology students of Tilburg University in the Netherlands and 28 adults from the general Dutch population. The undergraduate students received course credit for participation, and adults from the general population were paid a small monetary reward for their participation. All participants signed an informed consent form, and the study was approved by the institutional ethics review board (EC-2016.26a). A psychological survey including assessment of social inhibition, and demographics (partner status, age, sex) was sent out via e-mail. After completion, participants were invited for participation in the Behavioral Physiology Lab (GO-LAB) at Tilburg University, where they performed several tasks that are described elsewhere (Duijndam et al., Under Review; Duijndam, Kupper, et al., 2020), and are not relevant for the current study. The participants filled out questionnaires about situation selection and modification between cognitive experimental tasks, with sufficient break time in between. After the first experimental task (non-arousing approach avoidance task), participants were given a 5-min resting period, thereby limiting its effect on the questions about situation selection and modification. After participation, participants were thanked and debriefed.

The second sample consisted of 318 undergraduate Psychology students of Tilburg University in the Netherlands, of which 243 Dutch and 103 international students. They received course credit for

participation and signed an informed consent form prior to participation. The study was approved by the institutional ethics review board (RP271). A psychological survey including assessment of social inhibition, demographics, and situation selection and modification, were sent out via e-mail. After participation, participants were thanked and debriefed.

Situation selection

To assess the extent to which participants select situations in order to regulate their emotional experiences, we used the six statements designed by Webb et al. (2018): (1) *I select activities that help me to feel good,* (2) *If a situation makes me feel good, then I try to stick around,* (3) *I gravitate towards people that put me in a good mood*, (4) *I keep doing something if it seems to be improving my mood*, (5) *I shy away from situations that might upset me,* and (6) *I steer clear of people who put me in a bad mood*. Questions 1–4 assess approach to positive situations, whereas questions 5 and 6 assess avoidance to negative situations. Because we wanted the approach and avoidance questions to be equally distributed in this questionnaire, we added three questions which were based on the questions above but aimed at avoidance instead of approach: (7) *If I know a situation will be uncomfortable or annoying, I tend to avoid it*, (8) *If I find myself in an uncomfortable situation, I try to get out of it as quickly as I can*, and (9) *I tend to avoid situations that have a negative impact on my mood*; and one approach question: (10) *I am attracted to activities that put me in a good mood*. The participants rated each statement on a 5-point scale from not at all (1) to very much like me (5).

Exploratory factor analysis in the first sample (see Supplementary File) yielded two dominant factors of situation selection, reflecting avoidance of negative situations and approach of positive situations. In addition, in the second sample, we calculated McDonalds Omega, showing excellent internal consistency overall and for the two factors, and performed confirmatory factor analysis which confirmed the two-factor structure (see Supplementary file for detailed description of both factor analyses).

Situation modification

Participants were asked to rate on a scale from 1 (not at all like me) to 5 (very much like me) whether they would engage in specific safety behaviors (i.e., actions taken to prevent, escape from, or reduce the severity of a perceived threat) while being in an awkward social situation, to assess behaviors of situation modification. Seventeen safety behaviors were adapted from research in anxiety disorders (Funayama et al., 2013; Helbig-Lang & Petermann, 2010; Salkovskis, 1991; Wells et al., 2016), and an overview of these behaviors is displayed in Figure 1. Each item is considered an individual behavior and belongs to one of the following (self-conceptualized) overarching containers: "avoidance behaviors" (e.g., avoid looking at others), "active control behaviors" (e.g., making jokes), or "self-control behaviors" (e.g., calm breathing). Omega total score for this behavioral index = .75. The 17-item Modification Behavior Scale for social situations can be viewed in the Online supplement.

Social inhibition

Social inhibition was assessed with the 15-item Social Inhibition Questionnaire (SIQ15; Denollet & Duijndam, 2019; Duijndam & Denollet, 2019), which assesses the broad social inhibition personality trait and its three underlying facets. Behavioral inhibition refers to difficulties to initiate conversation topics and to get the conversation going (e.g., "I have difficulty talking to other people"), interpersonal sensitivity to pervasive social-evaluative concerns (e.g., "I often worry that others may disapprove of me"), and social withdrawal to avoiding engagement in intense social or emotional situations (e.g., "I avoid getting close to other people"). Items were rated on a 4-point Likert scale

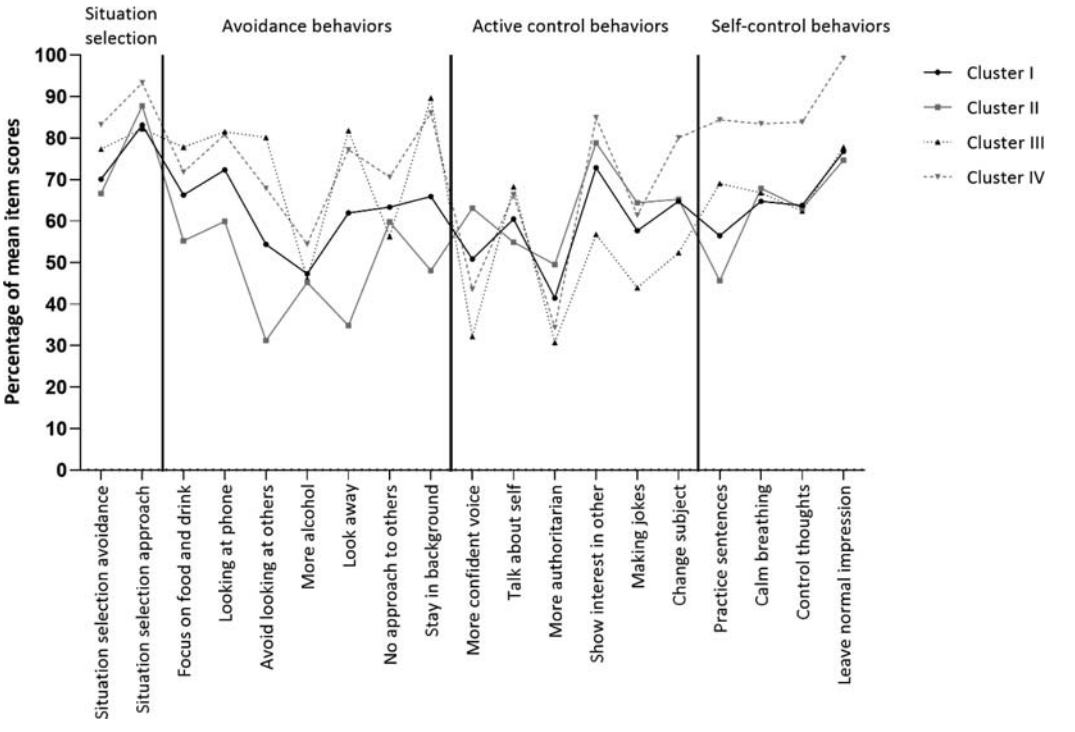

Figure 1. Graphical display of percentages of mean item scores by profile.
Note: This figure visualizes the four profiles (I = Approach dominant, overall moderate modification; II = Approach dominant, interactive; III = High avoidance & approach, avoidant modification; IV = High avoidance & approach, active & self-control modification) and the scores on situation selection preferences and modification behaviors as percentages of the maximum scale/item score.

ranging from false (0) to true (3), and each facet was represented by a subscale of five items. Cronbach's alpha in the current study yielded .93 for the total score, .92 for behavioral inhibition, .91 for interpersonal sensitivity, and .84 for social withdrawal, which is very comparable to the original validation study.

Data analysis

A three-step latent profile analysis (LPA) was performed in Latent Gold 5.1 (Vermunt & Magidson, 2005). Latent profile analysis is a form of finite mixture modeling (ML-based) used to identify the potential unobserved subgroups of individuals (or *classes*) among the set of indicators (McLachlan & Peel, 2000). We added the situation avoidance and approach scales (continuous variables), as well as all modification behaviors (ordinal variables) to the model. In the first step, a latent profile model was built by estimating models with an increasing number of classes, i.e., profiles (1–8). We used 25 random starting value sets, with 50 iterations each. The bootstrapped likelihood ratio test (BLRT), the Bayesian information criterion (BIC), and the Akaike information criterion 3 (AIC3) were used to choose the most parsimonious and best fitting model (Kass & Wasserman, 1995); for the fit indices holds that lower values indicate the better fit. For the BLRT a *p*-value is provided, to indicate whether a larger model is a significant improvement of the fit. It is important to point out that LPA takes classification inaccuracy into account, and hence every individual has a probability of belonging to each identified profile. When an additional latent profile had little substantive meaning, we used content considerations to decide between models (Hagenaars, 1990).

In the second step, posteriors were exported for the best fitting model, i.e., profile membership probabilities and corresponding class assignments, were added to the data file. Each participant received a likelihood of belonging score for each profile, ranging from 0.00 to 1.00.

In the third step, the association of social inhibition and facets with the latent class posteriors was examined. We added the total score first, and then replaced the total score with the three facet scores together in the model. The analyses comprised a multinomial logit model in Latent GOLD 5.1, considering the estimated classification errors that were estimated in the second step (Vermunt & Magidson, 2013). Wald statistic was used as a test of significance, and we also performed post-hoc Wald-tests to determine which specific subgroup difference induced the main significant predictor effect. Results included a test of all possible paired class comparisons (i.e., profile 1 vs. profile 2, profile 1 vs. profile 3, etc.), and we adhered to a significance level of $p < .05$. In Latent Gold 5.1, the output was described in log odds, but for interpretation purposes, we transformed all log odds values to odds (95%CI), as displayed in the results.

Results

Sample characteristics

Table 1 shows the sample characteristics. The study comprised 476 undergraduate students and 28 adults from the general population (total $N = 504$). The majority of the sample (i.e., 81%) was female, and the mean age was 21.5 ± 8.2 years. Participants had an average score of 15.1 ($SD = 9.6$, range = 0–45) on social inhibition, 4.5 ($SD = 3.8$, range = 0–15) on behavioral inhibition, 5.8 ($SD = 4.0$, range = 0–15) on interpersonal sensitivity, and 4.8 ($SD = 3.5$, range = 0–15) on social withdrawal (Table 1).

Given that we have used two independent samples, we examined whether the two groups differed on the between-subjects variables in the analyses. Most importantly, ANOVAs showed that the two samples did not differ on the scores of the predictor variables social inhibition ($p = .341$), behavioral inhibition ($p = .158$), interpersonal sensitivity ($p = .330$), and social withdrawal ($p = .982$). For completeness, we also compared the scores on situation approach and avoidance, and the modification behaviors. Because 22 variables were compared, we adjusted the alpha to a significance level of $p = .002$ (.05/22 = .002) to reduce Type I error risk (Dunn, 1961). ANOVAs showed no difference in the total score of situation approach ($p = .633$) or situation avoidance ($p = .021$). Concerning the modification behaviors, Chi^2 tests showed one difference between groups for "No approach to others" ($p < .001$) with the second sample showed higher percentages for agreeing with this statement.

Latent profiles in situation selection and modification

A Latent profile analysis explored the presence of latent profiles in the situation selection and modification behavior repertoire. Table 2 reports the fit statistics of the subsequently fitted models. Models converged without error. Replicating the models arrived at the same solutions. Results showed a

Table 1. Sample characteristics ($N = 504$).

	Mean (SD)	% (N)
Age (years ± SD)	21.5 (8.2)	–
Women	–	81.9 (417)
Social inhibition (mean ± SD)	15.1 (9.6)	–
Behavioral inhibition (mean ± SD)	4.5 (3.8)	–
Interpersonal sensitivity (mean ± SD)	5.8 (4.0)	–
Social withdrawal (mean ± SD)	4.8 (3.5)	–

Table 2. Model fit evaluation information.

					Fit statistics			
Model	LL	BLRT		BIC (LL)	ΔBIC	AIC3	Npar	Classification error
1-cluster	−14646.63	–	–	29742.00	–	29509.27	72	0
2-cluster	−14311.95	669.36	*P*<.001	29209.76	−532.24	28905.90	94	0.07
3-cluster	−14212.37	199.17	*P*<.001	29147.70	−62.06	28772.76	116	0.11
4-cluster	**−14125.42**	**173.90**	***P*<.001**	**29110.92**	**−36.78**	**28664.84**	**138**	**0.10**
5-cluster	−14061.56	127.72	*P*<.001	29120.31	9.39	28603.12	160	0.15
6-cluster	−14012.96	101.55	*P*<.001	29160.23	39.92	28571.93	182	0.17
7-cluster	−13963.09	90.85	*P*<.001	29197.60	37.37	28538.18	204	0.17
8-cluster	−13913.45	77.54	*P*<.001	29235.43	37.83	28504.89	226	0.13

Note: The chosen model is presented in bold. Fit was evaluated, by calculating the bootstrapped likelihood ratio test (due to the large sample size, small deviations in fit cause significant changes in BLRT). Therefore, our main model fit was done by evaluating the change in BIC. LL = log likelihood; BLRT = bootstrapped likelihood ratio test. Npar = number of estimated parameters.

four-cluster model fit the data best according to the BIC and an eight-cluster model according to the AIC3. The BLRT found each model was a significant improvement compared to the prior, more parsimonious model. The BLRT is sensitive to small deviations between models at large sample sizes, and will very quickly suggest the presence of additional classes under these circumstances. This is what we saw in our results, where the BLRT still indicated a significant improvement for an 8-class model, in which the smallest class had a size of 2%. For this reason, research has indicated that the BIC tends to be a good indicator of the correct number of profiles (Tein et al., 2013). Because BIC was lowest for the 4-profile solution, and the class error was lower for the four-cluster model, we chose the model with four latent profiles (in bold) as the best fit to the data (Table 2). We also examined sample differences between cluster prevalence, and we could not find a significant difference in cluster prevalence between the two samples. Post-hoc statistical power was derived from the entropy R^2, which was .78 in our final 4-class model. The power calculation table in Gudicha et al. (2016) shows that for this entropy R^2 and a sample size of 504, statistical power is more than sufficient. Figure 1 visualizes the four profiles and the scores on situation selection preferences and modification behaviors as percentages of the maximum scale/item score.

As visualized in Figure 1, the largest profile (Profile I, *Approach dominant, overall moderate modification*, 51%, $n = 257$) comprised individuals with a high tendency to seek out positive situations. Modification behaviors were mostly somewhat to moderately used, except for: "avoiding the situation by looking at your phone", or "focusing on food", and actively coping by "showing interest in others", and "trying to make a good impression", which were more likely used within this profile. Profile II (*Approach dominant, interactive*, 25%, $n = 126$) was characterized by relatively low negative situation avoidance combined with high positive situation approach. This group was further characterized by low avoidance behaviors to modify a situation, i.e., they indicated not to avoid looking at others, not to look away and not to stay in the background. In addition, they showed relatively low self-control efforts (i.e., sentence practicing, thought control), and high conversational interaction behaviors (i.e., expressing interest in others and making jokes). The third profile (III: *High avoidance & approach, avoidant modification*; 17%, $n = 86$) comprised individuals who agreed for the most part with that they tend to seek out situations that feel positive and tend to avoid situations that bring more negativity. These individuals reported avoidance behaviors and self-control behaviors to be applicable to them when trying to modify situations. Moreover, they indicated to use almost all avoidance behaviors, while trying to leave a normal impression. Profile IV (*High avoidance & approach, active and self-control modification;* 7%, $n = 35$) summarized individuals who scored high on negative situation avoidance and were very focused on seeking out positive situations. With respect to the modification behaviors, these individuals reported higher use of self-control behaviors and some active control behaviors (i.e., showing interest in the other, changing the subject) to modify the situation.

Association with social inhibition trait

The associations of the social inhibition total score with the posterior scores were then tested for each cluster. Social inhibition was significantly associated with a higher odds of belonging to the *High avoidance & approach, avoidant modification* (III) and *High avoidance & approach, active and self-control modification* (IV) profiles, and smaller chance of belonging to the *Approach dominant, interactive* profile (II) (see Figure 2, Table 3).

Adding the three facets instead of the total score, results showed that behavioral inhibition and interpersonal sensitivity were significantly associated with the behavioral profiles of situation selection and modification, but social withdrawal was not (Table 3). Higher scores on the behavioral inhibition facet of social inhibition were associated with a higher odds of belonging to the *High avoidance & approach, avoidant modification* profile (III) and a lower odds of belonging to the *Approach dominant, interactive* profile (II). This difference was significant (*Wald* = 51.9, $p < .001$). Individuals characterized by higher scores on interpersonal sensitivity had a higher odds of belonging to the *High avoidance & approach, active and self-control* profile, and a significantly (*Wald* = 11.2; $p = .011$) lower chance of belonging to the other three profiles. Finally, the trait of social withdrawal was not associated with belonging to any of the profiles (*Wald* = 1.3; $p = .720$).

As we added the three facets to the analysis together, we were interested in finding out whether social withdrawal had a unique effect of its own, and if so, with which of the other facets it shared variance such that in the main analysis the social withdrawal facet was non-significant. Results showed that the univariate effect of social withdrawal was associated with a higher odds of belonging to profile III (*OR* = 1.19, (95% CI: 1.08–1.32)) and IV (*OR* = 1.13, (95% CI: 1.00–1.26)), and a lower odds of belonging to profile II (*OR* = .77, (95% CI: .70-.84); *Wald* = 57.1, $p < .001$). While adding interpersonal sensitivity did not change the predictive quality of social withdrawal for profile III (*OR* = 1.14, (95% CI: 1.04–1.26); *Wald* = 20.6, $p < .001$), adding the behavioral inhibition score rendered the effect non-significant (*Wald* = 3.6, $p = .31$).

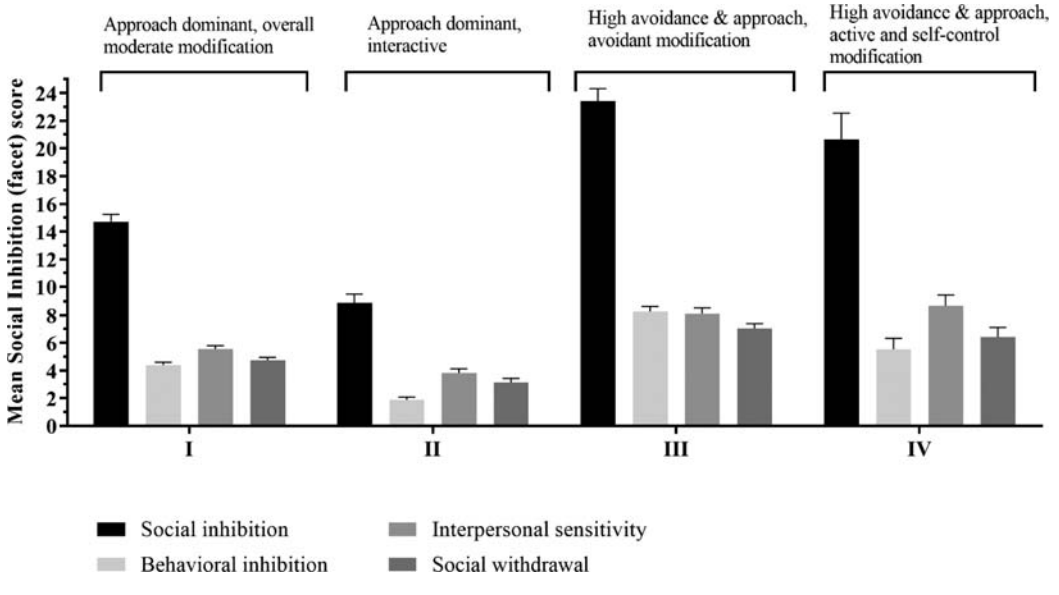

Figure 2. Mean social inhibition and facet scores by profile.

Table 3. Odds (95% CI) for social inhibition (facets) to be associated with the situation selection and modification profiles.

	Profile I *Approach dominant, overall moderate modification*	Profile II *Approach dominant, interactive*	Profile III *High avoidance & approach, avoidant modification*	Profile IV *High avoidance & approach, active and self-control modification*		
Class size	51%	25%	17%	7%		
Model 1. Total score			Odds		Wald	*p*-value
Social inhibition	.97 (.95–1.00)$_a$	.87 (.84-.90)$_b$*	1.11 (1.08–1.14)$_c$*	1.07 (1.02–1.12)$_a$*	94.48	< .001*
Model 2. Facet analyses			Odds		Wald	*p*-value
Behavioral inhibition	1.02 (.95–1.09)$_a$	.73 (.64–.83)$_b$*	1.41 (1.27–1.56)$_c$*	.96 (.83–1.10)$_a$	51.86	< .001*
Interpersonal sensitivity	.94 (.88–1.00)$_a$	.92 (.84–1.00)$_a$	.96 (.88–1.05)$_a$	1.21 (1.08–1.36)$_b$*	11.15	.011*
Social withdrawal	.99 (.93–1.05)$_a$	.96 (.87–1.05)$_a$	1.00 (.91–1.10)$_a$	1.06 (.95–1.19)$_a$	1.33	.720

Note: *$p < .05$. Letters in subscript indicate significant differences between pairs of profiles resulting from post hoc analysis, with profiles with different letters showing significantly different associations with social inhibition (facets).

Discussion

The current study applied a person-centered approach to identify within-person behavioral patterns in situation selection and modification. Latent profile analysis revealed the presence of four profiles, which differed in the extent of situation approach or avoidance tendencies and the extent of which certain behaviors are used to modify a situation. With respect to situation selection, the largest two profiles show adaptive emotion regulation, and included participants who predominantly sought to approach positive situations, while sometimes avoiding negative situations. The two smaller profiles were more maladaptive and comprised of individuals who in addition to approaching positive situations also avoided most negative situations. With respect to behavior modification, we saw that profiles differed in one or more behavioral category. While the majority profile (I) occasionally used all kinds of modification behaviors, the other profiles relied upon a specific category of behaviors. While people in profile II were versatile in social interaction, and used active conversational behaviors to deal with awkward social situations, the people in profile III predominantly used avoidance behaviors, and those in profile IV mostly used active control and self-control behaviors. Social inhibition was associated with a higher chance of belonging in profile III and IV, characterized by high situation avoidance and either avoidance or control-related modification behaviors.

With respect to situation selection, our results indicate that the majority of the participants tend to approach positive situations and to a lesser extent avoid negative situations. This balance in situation approach and avoidance seems adaptive, as it is effective in reducing negative emotional experiences (e.g., Thuillard & Dan-Glauser, 2017; Vujovic et al., 2014; Vujovic & Urry, 2018; Webb et al., 2018). Too much avoidance, however, is considered maladaptive in the anxiety literature, because it may maintain unrealistic beliefs about the threatening situation (Aafjes-van Doorn et al., 2019; Funayama et al., 2013; Salkovskis, 1991; Wells et al., 2016), and we observed this in profiles III and IV. Additionally, avoidance involves disengagement from stressors and a missed opportunity to learn from the negative situation (Sheppes & Gross, 2011), indicating that employing situation selection is not adaptive in all situations. It is important to realize that individual differences in situation selection and its effectiveness in reducing negative emotions may depend on a range of context and personal variables, such as the intensity (Van Bockstaele et al., 2020) and controllability (Troy et al., 2013) of the negative situation, having difficulties with employing other emotion regulation strategies (Webb et al., 2018), or being able to have a free choice in which way to regulate (Thuillard & Dan-Glauser, 2017). For example, in high intensity negative situations it is more adaptive to avoid, while in lower intensity situations reappraisal is the more adaptive choice (Van Bockstaele et al., 2020).

Our results suggest that individuals display a whole range of modification behaviors and are not necessarily bound to a few behaviors within the same category. The combination of modification behaviors may rather be complementary than independent (Lazarus, 2006) which is in concordance with the person-centered approach we took in the current study. For example, momentary emotion-focused control behaviors may reduce negative emotions elicited by the threatening situation, so that problem-focused behaviors may be more effective. Effective problem-focused behaviors diminish threat by adequately diverting it (Hofmann & Hay, 2018), for example by changing the subject, start a conversation with others, or making a joke. In our study, we call these *Active control behaviors,* but others also have referred to these behaviors as involving agency, i.e., gaining control over the situation by their own actions (Moscarello & Hartley, 2017). Because the current study is the first to identify these behavioral modification patterns, future research should focus on (1) replication of these findings, (2) find out which patterns may be more adaptive than others, and (3) for whom these strategies may be beneficial in reducing threat perception.

With respect to social inhibition, individuals with higher scores were more likely to belong to the avoidance behavior profile. Reliance on modification behaviors that are portrayed by a pattern of avoidance of social interaction, combined with a high frequency of employing control modification behaviors to gain control over a fearful situation is characteristic of social anxiety (Wells et al., 2016) and avoidant personality disorder (Lampe & Malhi, 2018), and may therefore be considered maladaptive. Socially inhibited individuals may engage in avoidant behaviors during social interaction, because they anticipate criticism or rejection from (Denollet & Duijndam, 2019). Due to the increased levels of anxiety, socially inhibited individuals may not be able to effectively regulate their emotions because they either do not feel the need to regulate, believe that they will not be successful at regulation, or simply do not know how to regulate (Webb, Schweiger Gallo, et al., 2012).

The behavioral inhibition facet of social inhibition is characterized by difficulty to initiate a conversation and keeping the conversation going (Denollet & Duijndam, 2019), which corresponds with our results showing that behavioral inhibition is especially associated with the *High avoidance & approach, avoidant modification* profile. This profile is characterized by low scores on active control modification behaviors such as speaking with a more confident voice. This indicates that behaviorally inhibited individuals mostly rely on behaviors that do not include verbal communication skills.

Interpersonal sensitivity was associated with the *High avoidance & approach, active and self-control modification* profile. Our results indicate that individuals characterized by high interpersonal sensitivity tend to use emotion-focused self-control behaviors a lot. Emotion-focused regulation strategies aim to be self-soothing (i.e., control breathing, thoughts) and seeking approval by others (i.e., leaving a good impression), thereby minimizing the distress triggered by the threat. This is in concurrence with the observation that interpersonally sensitive individuals want to gain approval of others (Asendorpf, 1990; Duijndam & Denollet, 2019). On the other hand, interpersonally sensitive individuals make less use of active control modification behaviors, and have a tendency to employ avoidant behaviors which may be caused by their fear of rejection. Thus, interpersonally sensitive individuals may be motivated to approach others in the interest of being polite and leaving a good impression, but at the same time use avoidant behaviors to prevent confrontation (Goetz et al., 2016; Wells et al., 2016).

Social withdrawal was unrelated to any of the profiles when all facets were added to the model. However, post-hoc test revealed that social withdrawal was significantly associated with a higher odds of belonging in the *High avoidance & approach, avoidant modification* profile, which is in line with our hypothesis. When behavioral inhibition was added to the model, social withdrawal was no longer associated with this profile. This may suggest that the behavior associated with the affective component of social inhibition (withdrawal) coincides with the behaviors described in the behavioral component (inhibition) of social inhibition.

Our preliminary findings add to the emotion regulation literature by showing that social inhibition affects the balance between approach and avoidance, favoring avoidance of negative

situations, which may affect well-being. Thus far, most research on emotion regulation has isolated each strategy in an attempt to investigate its effects on health and well-being, and to compare its effectiveness with other strategies (Webb, Miles, et al., 2012). However, emotion regulation in daily life is much more complex, and strategies may act complementary in an attempt to reach a specific goal (Gross, 2015). In a recent review, Ford et al. (2019) coined the term *polyregulation*, which is "the idea that individuals often use more than one regulation approach within one emotional episode" (p. 198). Given the possible simultaneous occurrence of situation-targeted emotion regulation with other strategies, we cautiously speculate that instead of approaching modification behaviors as an early emotion regulation strategy, contrasted to reappraisal as an example of later emotion regulation, modification behaviors may be considered to work in parallel, making use of attentional diversion, suppression, and reappraisal to establish effective regulation. In support of our speculation, modification behaviors may overlap with reappraisal strategies (e.g., making a joke to decrease the emotional impact of a negative situation may also be viewed as a form of reappraisal). We therefore tentatively suggest that strategies may be categorized as behavioral (situation selection and modification) vs. cognitive (attentional deployment, cognitive reappraisal, and expressive suppression) strategies. However, more research is necessary to validate this idea.

Limitations and future research directions

The results of this preliminary study should be viewed in light of its limitations and strengths. Most participants were female (81%), and predominantly undergraduate psychology students (94%), suggesting that our results may not generalize to other populations. In addition, we relied on self-report questionnaire data to gain insight in habitual situation regulation strategies, which may not have completely captured their use in real-life settings and self-report includes a risk of social desirability. Because of the cross-sectional design, no causal relationships can be established about our results. Additionally, we found the second sample to use *not approaching others* more often as a modification behavior compared to the first sample. Given that the first sample filled out the questionnaires in the lab and the second sample online at home, this may suggest that the second sample is perhaps less likely to approach new situations (like a first-year student coming to the lab) and therefore may score higher on this item. However, this study was the first to identify within-person patterns of situation regulation, which is a strength. Another strength lies in examining how individual differences (i.e., social inhibition) are related to these profiles, suggesting that personality traits are of influence on the range and quality of modification behaviors and response tendencies.

Future research may want to focus on a broader range of modification behaviors, as the current study specifically focused on social interaction. Furthermore, observational studies may provide more insight in which modification behaviors occur most often, in which order, and under what contextual circumstances. Research should replicate and elaborate on our findings, by examining individual differences related to these situation regulation patterns, and how these patterns relate to emotional well-being. Identifying behavioral patterns in clinical samples (e.g., social anxiety, avoidant personality disorder) may help in choosing appropriate therapies directed towards eliminating these maladaptive behavioral patterns. In addition to situation regulation strategies, we may be able to identify emotion regulation patterns by including all strategies of Gross' process model (i.e., attentional deployment, cognitive reappraisal, expressive suppression). This may give insight in how particular patterns of polyregulation may unfold, and which strategies are most likely to co-occur.

Conclusion

In conclusion, the current study showed preliminary support for the presence of four different profiles of situation selection and modification, using a person-centered approach. Social inhibition and the underlying facet behavioral inhibition were mostly associated with belonging in the *High*

avoidance & approach, avoidant modification profile, indicating that socially inhibited individuals particularly rely on avoiding negative situations, and use situation modification behaviors characterized by avoidance while in an uncomfortable situation. Univariate analyses showed social withdrawal to also belong to this profile, but this effect was confounded with the effect of behavioral inhibition, suggesting that the behaviors associated with social withdrawal coincide with the behaviors described in behavioral inhibition. Additionally, interpersonal sensitivity was associated with emotion-focused self-control behaviors, which may illustrate that interpersonal sensitive individuals use avoidance selection and modification behaviors to prevent confrontation, but at the same time are also motivated to approach others to gain approval. Future research is encouraged to use a person-centered approach to gain more knowledge on the interplay of multiple emotion regulation strategies.

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