Inability to Control Inner Speech Linked to Negative Mental Health

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Abstract

In this exploratory study, we investigated how task-based inner speech initiation and suppression relate to broad psychological dimensions. A large online sample (N = 453) completed two one-minute inner speech tasks (initiation vs. suppression) and a battery of 11 questionnaires covering inner experience, personality, mental health, and self-regulation. Exploratory factor analysis identified seven latent factors, including *Negative Mental Health* and *Inner Speech*. The Negative Mental Health factor predicted higher reported inner speech frequency despite attempted suppression, while showing no association with attempted initiation. The questionnaire-derived Inner Speech factor predicted general inner speech propensity in the tasks. These findings suggest that impaired suppression, rather than elevated initiation, characterizes inner speech dysregulation in mental health risk, highlighting the importance of incorporating regulation and control dimensions into future inner speech measures.

Keywords: inner speech; suppression; mental health; psychopathology; questionnaire

Introduction

It has previously been documented how trait-level inner speech frequency and valence are associated with various psychological variables (Alderson-Day et al., 2018; Ren et al., 2016). However, the role of inner speech control and state-level experience remains less understood. Here, we investigate how task-based inner speech initiation and, critically, suppression relate to broad psychological dimensions, using exploratory factor and regression analyses, thereby extending the scope of inner speech research.

Inner speech can be defined as the conscious experience of producing language, perceptible only to the self and without visible movements or external sound (Alderson-Day & Fernyhough, 2015a; Wallentin et al., 2025). Similar to other forms of inner experience, inner speech exhibits large individual variability in frequency, ranging from complete absence to almost constant occurrence (Heavey & Hurlburt, 2008; Hurlburt & Krumm, 2025; Nedergaard & Lupyan, 2024). These differences are linked to various cognitive factors. For example, individuals who report more frequent visual imagery tend to experience inner speech more often (Heavey et al., 2019). Autistic individuals are likely to be disrupted or delayed in the development of inner speech, though empirical findings remain mixed (Alderson-Day & Fernyhough, 2015a; Granato et al., 2021; Williams et al., 2008).

Such variability in frequency carries important behavioral and cognitive implications, as inner speech has been proposed to serve a range of functions (Fernyhough & Borghi, 2023; Perrone-Bertolotti et al., 2014). Individuals who report lower propensity to experience inner speech perform worse on a verbal working memory task and a rhyme judgment task (Nedergaard & Lupyan, 2024). Moreover, experimental interference with inner speech has been shown to reduce physical endurance (Nedergaard, et al., 2023a). In contrast, strategic use of inner speech can help self-regulation, leading to improved attentional control (Nedergaard, et al., 2023b) and more effective emotion regulation (Kross et al., 2014). Inner speech has also long been considered crucial to the reading process and has been adopted as a strategy to support the reading and writing of poor readers (Ehrich, 2006; Liva et al., 1994).

However, dysregulated or excessive inner speech can become maladaptive. Evaluative inner speech (i.e., inner speech used to evaluate situations, people, and the self) has been found to be positively correlated with depression and anxiety (McCarthy-Jones & Fernyhough, 2011; Alderson-Day et al., 2018), while greater frequency of inner speech or internal dialogue is associated with higher levels of attention deficit hyperactivity disorder (ADHD) traits (Benfield & Cole, 2026) and neuroticism (Conley, 2021; Łysiak, 2019; Sobol-Kwapinska et al., 2019; Verhaeghen & Mirabito, 2021).

Many existing studies on inner speech have developed questionnaire-based measures and focused only on its reported frequency, content, or functions at a trait level (e.g., Brinthaupt et al., 2009; Hatzigeorgiadis, 2006; Morin et al., 2011, 2018). Consequently, investigations into the relationship between inner speech and other psychological variables have mainly relied on these questionnaires and have been largely limited to the established dimensions of inner speech (e.g., Benfield & Cole, 2026; Ren et al., 2016; Verhaeghen & Mirabito, 2021). The validity of questionnaire-based measures has been vigorously debated,

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and whether they can capture the features of state-level inner speech remains questioned (Alderson-Day & Fernyhough, 2015b; Hurlburt et al., 2022; Uttl et al., 2011). More importantly, few studies, to our knowledge, have paid attention to individual ability to regulate or suppress inner speech, or how such abilities relate to cognition and behavior. Traditionally, inner speech suppression (e.g., articulatory suppression) has been employed merely as a methodological tool to probe the functions of inner speech (Nedergaard, et al., 2023c), rather than as an object of investigation in its own right. Yet, both failures and attempts to control inner speech are closely implicated in psychopathology. For instance, rumination, defined as repetitive and passive thinking about distress symptoms and their causes and consequences, is predominantly verbal (Ehring & Watkins, 2008) and notoriously difficult to control or stop (Nolen-Hoeksema et al., 2008; Yang et al., 2017). It is an important vulnerability factor in the development of depression. Similarly, auditory verbal hallucinations (AVH), a core feature of psychotic disorders (Pepin et al., 2026; Upthegrove et al., 2016), have been conceptualized as a failure to suppress irrelevant mnemonic intrusions (Michie et al., 2005) or as impaired agency attribution during the production of dialogic inner speech (Rapin et al., 2013). Paradoxically, thought suppression, often used to control unwanted experiences such as rumination or AVH, is associated with increased depressive symptoms (Szasz, 2009) and greater AVH severity (Badcock et al., 2011), suggesting excessive attempts to control inner speech may have maladaptive effects. These findings lead us to ask: *what happens when people attempt to suppress inner speech, and how is this capacity related to other psychological dimensions?* Investigating these questions may expand our understanding of inner speech beyond established dimensions and provide novel insights into its role in psychopathology.

In this exploratory study, we examine whether ability to voluntarily initiate and suppress inner speech is linked to a broad range of psychological variables. To this end, we adapted established paradigms for eliciting inner speech (Wallentin et al., 2025), to move beyond trait-level assessment to explore state-level inner speech, while placing inner speech suppression at the center of our investigation. Given the lack of existing research on inner speech suppression and its cognitive correlates, we adopted an exploratory approach, incorporating multiple psychological dimensions previously discussed in the inner speech literature alongside two additional domains of self-regulation (risk-taking and eating control; Eisenberg et al., 2019). These dimensions were assessed using validated questionnaires and analyzed using exploratory factor analysis. Robust regression modeling was then employed to examine how the resulting latent factors predict inner speech phenomenology. The findings are intended to inform pre-registered hypotheses to be tested in future studies.

Methods

Participants

A total of 503 participants, representative of the British population and recruited on Prolific (www.prolific.com), completed the study. Eligible participants were required to be aged 18 years or older and fluent in English. Following our pre-defined exclusion criteria, participants were excluded if they (a) failed the automated bot detection (n=0), (b) incorrectly reported the type of inner speech task just completed (e.g., identifying the task as suppression when it was actually initiation; n=44), (c) failed two or more attention checks (n=2), or (d) exhibited unusually fast responding, defined as having the average of ten fastest questionnaire response times 2 *SDs* below the sample mean (Berger & Kiefer, 2021; Huang et al., 2012; n=6). The final sample consisted of 453 participants (230 female, 204 male, 19 non-binary/other; median age: 46 years; age range: 19-84 years).

Procedure

The study was hosted online and implemented using jsPsych (v 8.2.2; de Leeuw et al., 2023). The median time taken to complete the entire study was 35 minutes (range: 17-211 min.), and participants received 8.5 GBP as compensation. All participants provided informed consent prior to participation. Participants first provided demographic information, then completed two inner speech tasks, followed by a battery of 11 questionnaires. Finally, participants were debriefed. The study was approved by the Research Ethics Committee at Aarhus University (approval number: 2025-046).

Materials

Inner Speech Task Participants performed two inner speech tasks designed to assess their capacity to initiate and suppress inner speech. The tasks consisted of two one-minute trials with the following instructions:

- Initiation trial: “Please talk to yourself in your head for 60 seconds, continuously. You decide what to say, and repetition is allowed.”
- Suppression trial: “Please stop yourself from inner speech for 60 seconds, i.e. stop yourself from talking to yourself in your mind.”

Trial order was counterbalanced across participants. After each trial, participants provided (a) the experienced percentage of inner speech during the 60 s, as well as ratings on Visual Analogue Scales (VAS) to assess their subjective experience during the tasks. These VAS items measured their (b) urge to engage in inner speech, (c) willpower required to initiate/suppress inner speech, and (d) emotional valence of any experienced inner speech. Responses for (a), (b) and (c) were recorded on a continuous scale from 0 to 100, with higher scores representing greater percentage/intensity.

Valence (d) was recorded on a -50 (negative) to 50 (positive) scale.

Questionnaires Participants completed a battery of 11 established questionnaires (227 items in total) spanning diverse inner experience and psychological domains. Specifically, these measured:

- **Inner experience 1**: the Varieties of Inner Speech Questionnaire (VISQ-R; Alderson-Day et al., 2018);
- **Inner experience 2**: the Internal Representations Questionnaire (IRQ; Roebuck & Lupyan, 2020);
- **Inner experience 3**: a shortened form of Betts' Questionnaire upon Mental Imagery (QMI; Sheehan, 1967);
- **Inner experience 4**: the Nevada Inner Experience Questionnaire (NIEQ; Heavey et al., 2019);
- **Personality**: a short form of International Personality Item Pool (mini-IPIP; Donnellan et al., 2006);
- **Attention**: the Adult ADHD Self-Report Scale (ASRS; Kessler et al., 2005);
- **Autistic traits**: the Short Autism Spectrum Quotient (AQ-10; Allison et al., 2012);
- **Depressive symptoms**: the Patient Health Questionnaire – depression scale (PHQ-9; Kroenke et al., 2001);
- **Reading abilities**: the Adult Reading Questionnaire (ARQ; Snowling et al., 2012);
- **Risk-taking**: the Domain-Specific Risk-Taking scale (DOSPERT; Blais & Weber, 2006);
- **Eating control**: the Three-Factor Eating Questionnaire (TFEQ-R18; Karlsson et al., 2000).

The latter two are independent domains in self-regulation (Eisenberg et al., 2019) that have not been included in previous inner speech studies. To minimize order effects, questionnaire presentation was randomized across participants. Within each questionnaire, items were also presented in a randomized order, with the exception of the ARQ, which utilized a fixed order due to item dependencies.

Statistical Analyses

Exploratory Factor Analysis To reduce the dimensionality of the questionnaire battery while preserving its underlying structural factors, we conducted an exploratory factor analysis (EFA) on the 43 established subscale scores within the 11 questionnaires, using the *psych* package in R (Revelle, 2017). All data were standardized (*z*-scored) prior to analysis. We used Horn's parallel method (Horn, 1965) to determine the number of latent factors; this suggested 7 non-random factors. As these factors were subsequently to be used as predictors in regression models, we extracted them using the minimum residual method (minres; Harman & Jones, 1966) with orthogonal rotation (varimax; Kaiser, 1958), to provide uncorrelated factors and thereby preclude multicollinearity. The cumulative proportion of variance explained by the 7 factors was 0.498. Factors were labeled by the authors by inspecting the features yielding the highest factor loadings. The extracted factors and their respective proportions of explained variance were: *Imagery* (0.160), *Negative Mental Health* (0.095), *Inner Speech* (0.064), *Autism* (0.053), *Risk Taking* (0.053), *OtherPeople/Orthographic* (0.042), *Eating Disorder* (0.031).

The *Imagery* factor had high loadings across all subscales of the QMI as well as the visual-related subscales of the IRQ (Visual) and NIEQ (Inner Seeing). The *Negative Mental Health* factor had high loadings on ADHD (loadings: inattention = 0.80, hyperactivity/impulsivity = 0.62), neuroticism (0.73), depression (0.70), conscientiousness (−0.60), evaluative inner speech (0.55), and dyslexia (0.53). The *Inner Speech* factor had the highest loadings on speech/verbal-related internal representations. The *OtherPeople/Orthographic* factor had the highest loading on having a presence of other people in inner speech and higher endorsement of experiencing orthographic imagery.

Oblique rotation (oblimin; Carroll, 1957), which permits correlations between factors, yielded a very similar solution. Full factor loading matrixes for both rotations can be found at https://osf.io/m8evk. As this study is exploratory, the estimated factors serve as preliminary constructs to be validated via confirmatory factor analysis (CFA) in future research.

Regression Analyses Each participant ended up with 8 inner speech task measures: 2 trials (suppression, initiation) x 4 domains (frequency, urge, willpower, valence). To examine which estimated questionnaire factors could predict the inner speech task measures, we conducted regression analyses in R (v. 4.5.0) with the following pseudo code, separately for each task measure:

$$InnerSpeechTaskMeasure \sim EstFactor_1 + \cdots + EstFactor_{n-1} + EstFactor_n$$

We conducted initial analyses using linear models on the original data. However, all models failed the normality assumption and over half violated homoscedasticity. Consequently, we employed beta regression models with a logit link function using the *betareg* package (Cribari-Neto & Zeileis, 2010). To accommodate the requirements of the beta distribution, we rescaled inner speech task measure scores ([0-100]) to [0,1] and applied the transformation $y \cdot (n - 1) + 0.5/n$ (n: sample size) following Smithson & Verkuilen (2006). Model comparison was guided by the Akaike Information Criterion (AIC; Akaike, 2003) and the Bayesian Information Criterion (BIC; Schwarz, 1978), comparing linear and beta models across original and transformed data. A Bonferroni correction was applied to significance (Dunn, 1961) to control for multiple comparisons.

Finally, to further assess the robustness of our primary findings, complementary Bayesian regression models were conducted using the *brms* package (Bürkner, 2017).

Results

Distributions for the frequency and valence of inner speech experienced under both tasks are displayed in Figure 1. As can be seen, most participants were able to initiate and sustain inner speech throughout the 60s (top right panel), while few were able to suppress inner speech completely (top left panel).

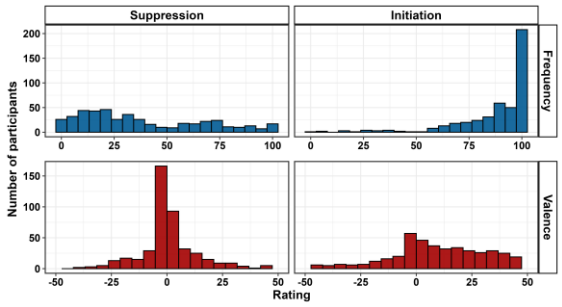

Figure 1: Inner speech frequency and valence distributions by task condition.

Across all eight inner speech task measures, beta regression models consistently demonstrated superior fit over linear models, as indicated by lower AIC and BIC values. For most measures, the best fit was achieved using transformed data; however, the valence of inner speech during suppression was best modeled using original scores. These results align with the observed data distribution (Figure 1).

The optimal models revealed that during the suppression task, the *Negative Mental Health* factor was a significant positive predictor of the frequency of inner speech (coef: 0.260 (±0.058), z=4.517, p<0.0001), the urge to do inner speech (coef: 0.190 (±0.059), z=3.233, p<0.01), and the willpower required to stop inner speech (coef: 0.164 (±0.056), z=2.910, p<0.05). Besides, the *Negative Mental Health* factor was a significant negative predictor of the valence of experienced inner speech, during both the suppression task (coef: −0.003 (±0.001), z=−4.100, p<0.001) and the initiation task (coef: −0.241 (±0.053), z=−4.581, p<0.0001).

Similarly, the questionnaire-derived *Inner Speech* factor emerged as a significant positive predictor of both the frequency of inner speech (suppression: coef: 0.351 (±0.058), z=6.074, p<0.0001; initiation: coef: 0.270 (±0.054), z=4.973, p<0.0001) and the urge to do inner speech (suppression: coef: 0.445 (±0.060), z=7.447, p<0.0001; initiation: coef: 0.313 (±0.060), z=5.197, p<0.0001) across both tasks. It positively predicted the willpower required to stop inner speech during suppression (coef: 0.427 (±0.057), z=7.434, p<0.0001), whereas it negatively predicted willpower required to do inner speech during initiation (coef: −0.416 (±0.062), z=−6.732, p<0.0001).

In addition, during the initiation task, the *Imagery* factor positively predicted the urge to do inner speech (coef: 0.203 (±0.056), z=3.621, p<0.01), whereas the *OtherPeople/Orthographic* factor positively predicted the willpower required to do inner speech (coef: 0.220 (±0.066), z=3.348, p<0.01). Valence of inner speech was also positively predicted by the *OtherPeople/Orthographic* factor during both the suppression (coef: 0.003 (±0.001), z=3.480, p<0.01) and initiation (coef: 0.234 (±0.056), z=4.149, p<0.001), and negatively predicted by the *Eating Disorder* factor during initiation (coef: −0.192 (±0.056), z=−3.439, p<0.01).

All primary findings (Figure 2) were further supported by Bayesian regression modeling, which yielded consistent results, confirming the robustness of the identified effects.

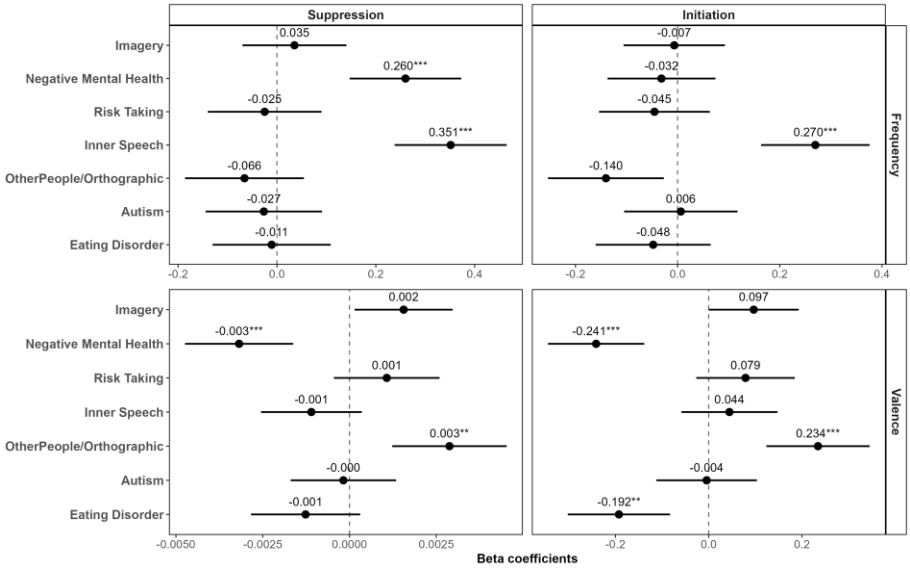

Figure 2: Forest plots of beta coefficients from the optimal regression models for the estimated factors predicting inner speech task measures (top row: frequency; bottom row: valence) during the suppression (left) and initiation (right) tasks. Error bars indicate 95% confidence intervals. *** $p < 0.001$; ** $p < 0.01$ (Bonferroni corrected).

Discussion

In the present exploratory study, we examined how individual differences in the ability to initiate and suppress inner speech relate to seven estimated psychological factors. We found that the *Negative Mental Health* factor was a robust predictor of suppression failure, while showing no significant association with the ability to initiate inner speech. In addition, the emotional valence of experienced inner speech was consistently more negative in individuals with higher mental health risks. Furthermore, the trait-level *Inner Speech* factor (derived from questionnaires) was associated with higher state-level inner speech frequency during the tasks.

Negative Mental health and Suppression Failure

The exploratory factor analysis yielded a *Negative Mental Health* factor, which primarily comprises ADHD traits (inattention and hyperactivity/impulsivity), neuroticism, depression, low conscientiousness, evaluative inner speech, and dyslexia. This factor encompasses two fundamental dimensions of common mental disorders: internalizing (neuroticism, depression) and externalizing (ADHD traits) (Kotov et al., 2017) and is therefore consistent with the hypothesized existence of a general psychopathology factor (p factor; Caspi et al., 2014; Lahey et al., 2012). The p factor represents a higher-order dimension directly influencing all of the diagnostic symptom factors and is related closely with the *super spectra* proposed by the Hierarchical Taxonomy of Psychopathology (HiTOP) framework (Kotov et al., 2017), although its validity remains the subject of significant debates (Bonifay et al., 2017; Gluschkoff et al., 2019; Van Bork et al., 2017).

The observation that this *Negative Mental Health* factor predicts a more negative emotional valence of inner speech aligns with previous findings. It has been found that negative emotional states, such as depression, anxiety, and neuroticism, are positively correlated with evaluative or self-critical inner speech (Alderson-Day et al., 2018; Sobol-Kwapinska et al., 2019; Conley, 2021; Verhaeghen & Mirabito, 2021).

More importantly, our results reveal that negative mental health predicts suppression failure rather than initiation capacity. While individuals scoring higher on the *Negative Mental Health* factor reported a higher frequency of intrusive inner speech, a stronger urge to engage in it, and greater required willpower when attempting to stop it, this factor showed no significant link to voluntary initiation. We propose that individual capacity for suppression reflects the regulatory dimension of inner speech, which appears impaired in those with mental health issues. This is supported in a linear regression model of *frequency difference* (initiation minus suppression), a more direct manifestation of individual general ability to voluntarily modulate inner speech. Correspondingly, the *Negative Mental Health* factor has a negative association with the frequency difference between tasks (coef: −0.087 (±0.016), $t(445)=-5.482$, $p<0.0001$), showing a reduced ability to regulate inner speech as mental problems increase. These findings suggest an underlying mechanism of the previously observed positive association between inner speech frequency and traits such as neuroticism, ADHD, and depression (Benfield & Cole, 2026; Conley, 2021): the challenge for individuals with these traits might not be that they continuously initiate (unexpected) inner speech, but that once initiated, it is hard for them to disengage from it. Whether such disinhibition of inner speech represents a domain-specific manifestation of impaired inhibitory control or a more independent process warrants further investigation.

These findings provide a mechanistic explanation for why thought suppression, as a self-control or emotion regulation strategy, is paradoxically associated with more severe mental disorders (Badcock et al., 2011; Szasz, 2009). For individuals with negative mental health, attempts to suppress thoughts or inner speech may not be successful. What's worse, suppression can even trigger a 'rebound effect,' where inner speech becomes more pervasive than it would be during natural states (Wegner et al., 1987). We identified a subset of participants (n=31) with non-positive values in the frequency difference between two tasks (initiation minus suppression, Difference $\leqslant 0$), indicating they experienced more inner speech under suppression than during voluntary initiation. A t-test shows that this group exhibited significantly higher levels of negative mental health compared to those who successfully modulated their inner speech (Difference > 0; $t(37.37) = 2.90$, $p = 0.006$). This suggests that for those with psychological distress, the attempt to silence the internal voice may not only fail but backfire. Furthermore, since poor mental health also biases the valence of inner speech toward the negative, the uncontrollable inner speech induced during thought suppression tends to be negative and finally deepens the severity of the individuals' mental health challenges.

Compared to suppression, more adaptive emotion-regulation strategies (Aldao et al., 2010) may include non-judgmental acceptance of internal voices (mindfulness; Segal et al., 2012), orofacial muscle relaxation (Nalborczyk et al., 2017), reinterpreting a stressful situation (reappraisal; Buhle et al., 2014), or modifying the situation to reduce negative thoughts at their source (problem-solving; Aldao et al., 2010).

Inner Speech Tasks and Questionnaires

The questionnaire-derived *Inner Speech* factor was characterized by high loadings on speech-/verbal-related internal representations and clearly separable from other domains of inner experience, such as visual imagery. This factor positively predicted the frequency and urge to engage in inner speech in both the initiation and suppression tasks. It also positively predicted the willpower required to suppress inner speech, while negatively predicting that required to initiate inner speech. Together, these associations indicate that trait-level individual differences in inner speech are systematically reflected in state-level measures.

Despite ongoing debates regarding the validity of generalized self-report measures of inner speech (Alderson-

Day & Fernyhough, 2015b; Hurlburt et al., 2022; Uttl et al., 2011), our findings support the factorial, discriminant, and predictive validity of the included questionnaires (Bolarinwa, 2015), as well as the convergent validity of the inner speech task measures.

However, although the *Inner Speech* factor predicted inner speech frequency in both tasks, linear modeling showed that it did not significantly predict the frequency difference between tasks (initiation minus suppression). This suggests a research gap in existing inner speech questionnaires: while they can effectively capture the general propensity for inner speech, they largely neglect the dimension of inner speech regulation or control. Although instruments for assessing general *thought* control ability do exist (e.g., Luciano et al., 2005), there is no validated measure specifically targeting *inner speech* control or suppression ability, to our knowledge. Our findings highlight the importance of this dimension in psychopathology, indicating that future scales would benefit from explicitly incorporating it.

Conclusion

In this exploratory study, we found a critical link between mental health and inner speech suppression ability: individuals with higher mental health risk showed greater difficulty regulating and suppressing inner speech. This finding provides preliminary evidence for the importance of investigating suppression in inner speech and psychopathology research. Future confirmatory studies will employ confirmatory factor analysis (CFA) and pre-registered protocols to test whether the identified factor structures and their predictive relationships replicate.

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