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Research paper

Dimensions of experienced gender and prospective self-injurious thoughts and behaviors in preadolescent children: A national study

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ABSTRACT

Objectives: Gender diverse youth face higher risk of engaging in self-injurious thoughts and behaviors (SITBs) compared to cisgender youth. Limitations in past research include a focus on older adolescents, an emphasis on specific gender identity labels that may not be inclusive of the range of youth gender experiences, and reliance on cross-sectional data. Thus, the current study prospectively evaluated dimensions of experienced gender in relation to first-onset SITBs among preadolescents.

Methods: Data were drawn from the Adolescent Brain Cognitive Development Study, a longitudinal study of youth across the United States. Youth ($n = 7909$) were aged 10–11 during initial assessment, and follow-up was conducted one year later. Two dimensions of experienced gender, felt-gender incongruence (not feeling aligned with the gender associated with one's sex assigned at birth) and gender non-contentedness (feeling dissatisfaction with the gender associated with one's sex assigned at birth), were assessed. Primary outcomes included non-suicidal self-injury (NSSI), suicidal ideation (SI), and suicide attempts (SA).

Results: Logistic regressions were conducted stratified by sex assigned at birth. For youth assigned female at birth, felt-gender incongruence was prospectively associated with first-onset NSSI and SI and gender non-contentedness was prospectively associated with first-onset of NSSI. For youth assigned male at birth, gender non-contentedness was prospectively associated with first-onset SI. Diverse experienced gender did not prospectively predict SA.

Conclusions: Dimensions of experienced gender may be associated with subsequent first-onset SITBs among preadolescents. These findings support the need for future research on risk and protective factors that may mediate or moderate this relationship.

The suicide rate among youth aged 10–14 has nearly tripled over the past decade and has become the second leading cause of death for this age group (Centers for Disease Control and Prevention, 2022; Curtin, 2019). Self-injurious thoughts and behaviors (SITBs), including non-suicidal self-injury (NSSI), suicidal ideation (SI), and suicide attempts (SA), are risk factors for suicide death (Castellví et al., 2017; Victor and Klonsky, 2014). Additionally, the onset of SITBs during preadolescence is associated with increased lifetime frequency and severity of SITBs (Ammerman et al., 2018; Muehlenkamp et al., 2019).

Transgender and gender diverse (TGD) youth (i.e., those whose gender identity or experienced gender does not conform to dominant gender expectations associated with their sex assigned at birth) are at high risk of SITBs (Jackman et al., 2021). TGD youth are 3–5 times more likely to report SI and 3–8 times more likely to report an SA compared to cisgender youth (Perez-Brumer et al., 2017). In a recent study using data from the Youth Risk Behavior Survey, a population-based survey, 43.9 % of TGD youth reported considering attempting suicide, 39.9 % reported making a suicide plan, and 34.6 % reported attempting suicide in the

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past year (Johns et al., 2019). Accumulating empirical evidence supports the minority stress model, which posits that the elevated risk for SITBs among TGD youth is *not* caused by their gender identity itself, but is instead driven by distal (e.g., transnegative discrimination, rejection, victimization, and non-affirmation) and proximal (e.g., negative future expectations, internalized transnegativity, and identity concealment) stressors shaped by cisnormativity (i.e., the assumption that having a binary, cisgender identity is the norm) and cisgenderism (i.e., the prejudiced ideology in which cisgender identity is valued over gender diverse identities; Hendricks and Testa, 2012; Meyer, 2003; Pellicane and Ciesla, 2022; Tebbe and Moradi, 2016).

The extant literature on SITBs among TGD youth is limited by its focus on adolescent youth (Hammack et al., 2022) and reliance on gender identity labels. Thus, little is known about risk of SITBs among preadolescent youth who have diverse gender experiences and who may not yet self-identify with specific gender diverse identity labels. Preadolescence is a critical age to examine self-injurious thoughts and behaviors among TGD youth because during this developmental time some preadolescents may begin to explore and reflect on their experience of gender and gender identities in part due to onset of puberty, social environments that are explicitly gendered, and developing sexuality (i.e., one's physical and emotional attractions towards other people; Steensma et al., 2013).

It is important that research in this age group engages with dimensions of experienced gender beyond explicit gender identity labels (i.e., labels such as cisgender, transgender, non-binary, genderfluid, etc.). This allows for a more comprehensive assessment of risk among youth with diverse experiences of gender without assuming or requiring youth to identify with specific gender identity labels. Gender is a multidimensional construct that includes internal domains (e.g., felt gender and gender contentedness) and external domains (e.g., gender expression and gender nonconformity) that play an important role in psychological adjustment in youth (Egan and Perry, 2001; Perry et al., 2019; Potter et al., 2021). Felt-gender incongruence describes experiences where one does not feel aligned with the gender associated with one's sex assigned at birth.[3] Gender non-contentedness describes feelings of dissatisfaction with the gender associated with one's sex assigned at birth. A multidimensional conceptualization of gender is needed to accurately capture the complexity of preadolescents' experienced gender (Becker et al., 2017). Attending to specific dimensions of gender (i.e., felt-gender incongruence and gender non-contentedness) instead of gender identity labels is important because, while not all youth who experience felt-gender incongruence and gender non-contentedness will identify with a gender diverse label, their diverse gender experiences may play a role in their internal and social experiences and ultimately their mental health outcomes.

Further, assessing dimensions of gender experience may provide more opportunities to include youth with non-binary gender identities. Prior studies have focused primarily on binary-identified transgender youth (i.e., those identifying as transmasculine or transfeminine) and may not capture the experiences of gender diverse youth who do not identify with binary labels, (i.e., those identifying with neither masculine nor feminine labels; Toomey, 2021). Among lesbian, gay, bisexual, transgender, queer/questioning (LGBTQ+) adolescents, as many as 23.9 % identify as non-binary and 12.4 % identify with the intersectional umbrella term, "queer" (Hammack et al., 2022). Additionally, 20 to 27 % of adolescents report some gender nonconformity (i.e., an experience or expression of gender that varies from the norms attributed to their sex assigned at birth or from traditional masculine and feminine norms; Rider et al., 2018). It is reasonably likely that a notable proportion of preadolescents may similarly identify as non-binary and/or gender nonconforming.

Lastly, limitations in previous research on diverse experiences of gender among preadolescents include a lack of developmentally appropriate language. Preadolescents may not fully understand or identify with specific gender identity labels. For example, in a longitudinal study, preadolescents were asked "Are you transgender?" At age 9–10, nearly 40 % chose the response "I don't understand," whereas by ages 11–12, this response decreased to 6 % (Dube et al., 2021). These findings demonstrate the need to collect information about dimensions of experienced gender using questions that do not assume knowledge of specific labels for gender identity. Assessing dimensions of experienced gender provides an opportunity to capture experiences of gender that exist across multiple distinct gender identities and can be done in a developmentally appropriate way with preadolescents (Potter et al., 2021).

Preadolescence is an important period for studying onset of SITBs, yet there is insufficient research examining dimensions of experienced gender in relation to SITBs among this age group. Moreover, prior studies on gender diversity and SITBs are cross-sectional or retrospective in nature (Hatchel et al., 2021). Building on this foundation, the current study expands on prior work by employing longitudinal analyses of first lifetime onset of SITBs. There is a need for examining the relationship between dimensions of experienced gender and the first onset of SITBs among preadolescents as a better understanding of this relationship would allow for early identification of risk and implementation of interventions tailored to address the specific mental health needs of gender diverse youth to reduce risk for subsequent suicidal behavior. Thus, the aim of the current study was to prospectively evaluate dimensions of experienced gender in relation to first-onset NSSI, SI, and SA in a large population-based sample of preadolescents. Drawing from gender minority stress theory, we hypothesized that felt-gender incongruence and gender non-contentedness would be prospectively associated with first-onset SITBs.

1. Methods

1.1. Participants

The Adolescent Brain Cognitive Development (ABCD) study is a national longitudinal cohort study that began in 2016 and includes youth recruited from 21 sites across the United States. The 2021 ABCD Data Release 4.0 was utilized for current analyses (ABCD Study, 2022). The sample for the current study included 7909 youth aged 10–11 at the time of completing an assessment of experienced gender. The sample was recruited primarily through elementary school systems that were geographically distributed across the United States. School sociodemographic factors including age, sex assigned at birth, race and ethnicity, socio-economic status (defined as percentage of youth receiving free or subsidized lunches), and urbanicity (rural/non-urban school status) were rated and oversampling of select schools was conducted to maximize the national representativeness of the sample (Garavan et al., 2018). Parents provided written informed consent and youth provided assent to a research protocol that was approved by the relevant institutional review boards for each recruitment site. Additional information regarding study design and sampling recruitment is provided elsewhere (Barbe et al., 2005; Barch et al., 2018; DeVille et al., 2020; Volkow et al., 2018; Zelazny et al., 2021).

1.2. Measures

1.2.1. Dimensions of experienced gender

Dimensions of experienced gender were assessed using the ABCD Youth Gender Survey. Youth reported on their felt gender and gender contentedness using 5-point Likert scales. Felt-gender incongruence was calculated using the sum of two questions, "How much do you feel like a

[3] It is important to note that although we do not intend to use the term "gender incongruence" in a pathologizing manner, the term has historically been used to pathologize trans and gender diverse people's experiences in mental health and related fields (Davies and Davies, 2020).

boy?" and "How much do you feel like a girl?" The two questions were recoded and summed to form a 2–10 scale where higher scores represented felt gender that was less congruent with sex assigned at birth. Gender non-contentedness was assessed using the question, "How much have you had the wish to be a boy/girl?" Youth were given the version of the question for the gender incongruent with their sex assigned at birth. These items were developed by the ABCD Gender Identity and Sexual Health workgroup in collaboration with the CDC Division of Adolescent and School Health. Child-report responses on the ABCD Youth Gender Survey, including these items, were found to correlate with the parent-report Gender Identity Questionnaire, which assessed the parent's perceptions of gender expression and gender dysphoria in their child (Potter et al., 2022).

1.2.2. Self-injurious thoughts and behaviors

The occurrence of current (i.e., past two weeks) and lifetime SITBs were assessed via youth report using the computerized version of the Kiddie Schedule for Affective Disorders and Schizophrenia DSM-5 Edition (K-SADS-5), a semi-structured interview (Kaufman et al., 1997; Townsend et al., 2020). Specific SITBs assessed included NSSI (self-injurious behavior without suicidal intent) and SA (self-injurious behavior with suicidal intent), as well as passive SI (i.e., a desire to be dead) and active SI (i.e., a desire to kill oneself). Passive and active SI were combined to measure presence of any SI for analyses. The K-SADS is widely used in clinical and research settings and generates valid and reliable measurements, including the computerized version (Barch et al., 2018; Kaufman et al., 1997; Townsend et al., 2020).

1.2.3. Depressive symptoms

Depressive symptoms were assessed using the Child Behavior Checklist (CBCL; Achenbach and Ruffle, 2000). The CBCL is a parent-reported measure of behavioral and emotional problems in youth where items are ranked on a 3-point Likert scale (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*). Parents were asked to endorse symptoms experienced by their child over the past six months. Raw scores on this measure were converted to *T*-scores. The CBCL is well-established with good reliability and validity as a measure of mental health problems in children (Achenbach and Rescorla, 2001).

1.2.4. Pubertal development

Pubertal development status was collected via youth report on the Pubertal Development Scale (PDS; Koopman-Verhoeff et al., 2020; Petersen et al., 1988). The PDS assesses development in areas of growth, body hair, skin changes, and sex-specific changes using 5 items, each ranked on a 1–4 scale (1 = *Not begun,* 2 = *Yes (barely),* 3 = *Yes (definitely),* 4 = *Development complete*). An average score across the 5 items was computed. The PDS has demonstrated good psychometric properties in assessing children's physical development in puberty (Koopman-Verhoeff et al., 2020).

1.3. Procedures

The study data was collected at three timepoints: Baseline, Year 1 (i.e., one year from baseline) and Year 2 (i.e., two years from baseline). Demographics, including sex assigned at birth, were collected via parent-report at Baseline. Dimensions of experienced gender were assessed via youth self-report on the Youth Gender Survey beginning at Year 1. Depressive symptoms were collected via parent report on the CBCL at Year 1. Pubertal development was collected via youth report on the PDS at Year 1. SITBs on the KSADS-5 were collected via youth self-report at Baseline, Year 1 and Year 2. Given that the Youth Gender Survey was administered at Year 1, prospective analyses required that we combine Baseline and Year 1 data (henceforth "Wave 1").

1.4. Data analysis

Wave 1 served as the first time-point and Year 2 data (henceforth "Wave 2") served as the longitudinal follow-up time-point in our analyses. For each SITB, first lifetime onset was defined as *not* having endorsed lifetime or current SITB at Wave 1 but endorsing that SITB at Wave 2. This meant that for analyses of first prospective lifetime onset of a given form of SITB, participants with a history of that SITB prior to Wave 1 (i.e., positive endorsement of the SITB at Baseline and/or Year 1) were screened out. Any occurrences of the SITB between Wave 1 and Wave 2 served as the outcome of interest. The outcomes of interest were first lifetime onset of NSSI, SI, and SA occurring in the year between Wave 1 and Wave 2. Analyses were restricted to individuals who had data for the variables of dimensions of experienced gender, depressive symptoms, and pubertal development.

We conducted logistic regression analyses to examine youth-reported felt-gender incongruence and gender non-contentedness at Wave 1 as continuous prospective predictors of new lifetime onset of NSSI, SI, and SA at Wave 2. Analyses were stratified by sex assigned at birth. Given that both depression and pubertal development are important predictors of SITB onset (Ho et al., 2022; Ribeiro et al., 2018), the CBCL depression subscale *T*-score and pubertal status on the PDS at Wave 1 were included as covariates in all analyses. For NSSI and SA, lifetime SI at Wave 1 was also included as a covariate. Descriptive analyses were conducted with Mann-Whitney *U* tests and Chi-Squared tests.

1.5. Transparency and openness

Access to the ABCD study data is available at the NIMH Data Archive and can be requested at https://nda.nih.gov/abcd. The ABCD Data Dictionary is also publicly available at this link. The analytic code and output for the current study are available at: https://osf.io/r69qy/?view_only=ea00fc6a65094c04893e9a2dc4a57e2c. This study's design and its analyses were not pre-registered.

2. Results

Study sample characteristics at Wave 1 are detailed in Table 1. The study sample consisted of 7909 youth (45.9 % assigned female at birth [AFAB]). The mean age at Wave 1 was 10.94 years old (SD = 0.65 years), and participants were primarily White (66.6 %) and non-Hispanic (80.0 %) with most household incomes ranging from $100,000 - $199,999 (30.5 %). In this sample, 0.8 % of youth answered "yes" or "maybe" when asked if they identified as transgender, although reported rates of felt-gender incongruence and gender non-contentedness were much higher. An additional 16.5 % reported that they did not know what the question on transgender identity meant. While dimensions of experienced gender were kept as continuous variables in analyses, among AFAB youth, 13.9 % reported at least some gender non-contentedness (i.e., scores >1 on the 1–5 scale) and 28.7 % reported at least some felt-gender incongruence (i.e., scores >2 on the 2–10 scale). Among assigned male at birth (AMAB) youth, 7.1 % reported at least some gender non-contentedness and 9.7 % reported at least some felt-gender incongruence.

For AFAB youth at Wave 2, the prevalence of first lifetime onset of SITBs was 3.1 % for NSSI, 4.7 % for SI, and 0.7 % for SA. For AMAB youth, the Wave 2 prevalence of first lifetime onset of SITBs was 2.0 % for NSSI, 3.4 % for SI, and 0.5 % for SA. Results of Mann-Whitney *U* tests showed that mean felt-gender incongruence and mean gender non-contentedness were significantly higher among AFAB youth compared to AMAB youth ($z = -21.93$, $p < .001$; $z = -10.02$, $p < .001$, respectively). In χ^2 tests, new onset of NSSI and SI were significantly more prevalent among AFAB youth than AMAB youth ($\chi^2(1) = 13.08$, $p < .001$; $\chi^2(1) = 15.60$, $p < .001$, respectively). There was no significant relationship between assigned sex at birth and SA.

Table 1
Participant demographics at Wave 1 stratified by sex assigned at birth.

	Assigned male at birth (n = 4278)	Assigned female at birth (n = 3631)	Combined (n = 7909)
Age, m (SD)	10.95 (0.65)	10.92 (0.65)	10.94 (0.65)
Race (%)			
White	67.6 %	65.4 %	66.6 %
Black/African American	13.2 %	14.3 %	13.7 %
Asian	1.8 %	1.9 %	1.9 %
Native American, Alaskan Native	0.3 %	0.5 %	0.4 %
Pacific Islander	0.1 %	0.1 %	0.1 %
Mixed Race	11.6 %	12.1 %	11.9 %
Other/Missing	5.4 %	5.7 %	5.5 %
Ethnicity (%)			
Hispanic	18.7 %	18.9 %	18.8 %
Non-Hispanic	80.1 %	80.0 %	80.0 %
Other/Missing	1.2 %	1.1 %	1.2 %
Household Income			
< $25,000	11.6 %	11.0 %	11.3 %
$25,000 - $49,999	12.2 %	13.5 %	12.8 %
$50,000 - $74,999	13.2 %	12.3 %	12.8 %
$75,000 - $99,999	13.5 %	14.5 %	13.9 %
$100,000 - $199,999	30.7 %	30.2 %	30.5 %
≥ $200,000	11.2 %	11.8 %	11.5 %
Missing	7.7 %	6.7 %	7.2 %
Gender Diversity (%)			
Felt-Gender Incongruence	9.7 %	28.7 %	18.4 %
Gender Non-Contentedness	7.1 %	13.9 %	10.2 %
Transgender Identity*	0.4 %	1.2 %	0.8 %
Depression *T*-Score, m (SD)	54.06 (6.15)	53.56 (5.83)	53.83 (6.01)
Pubertal Development, m (SD)	1.70 (0.48)	1.99 (0.60)	N/A
Prevalence of First-Onset Self-Injurious Thoughts and Behaviors (%)			
Non-Suicidal Self-Injury	2.0 %	3.1 %	2.6 %
Suicidal Ideation	3.4 %	4.7 %	4.3 %
Suicide Attempts	0.5 %	0.7 %	0.6 %

Note: * Transgender identity indicates those who responded "Yes" or "Maybe" to the question, "Are you transgender?" as per previous literature using this item (Dube et al., 2021).

Bivariate associations between the study variables are presented in Table 2. Results of logistic regression analyses for dimensions of experienced gender as a prospective predictor of first lifetime onset of SITBs at Wave 2 are presented in Tables 3 and 4. Among AFAB youth, felt-gender incongruence was significantly prospectively associated with first lifetime onset of NSSI (OR = 1.16, 95 % CI [1.02, 1.32]) and SI (OR = 1.18, 95 % CI [1.06, 1.32]). Gender non-contentedness was significantly prospectively associated with only first lifetime onset of NSSI (OR = 1.33, 95 % CI [1.03, 1.72]). Neither felt-gender incongruence nor gender non-contentedness were prospectively associated with first lifetime onset of SA among AFAB youth.

Among AMAB youth, gender non-contentedness was prospectively associated with first lifetime onset of SI (OR = 1.80, 95 % CI [1.29, 2.49]), but felt-gender incongruence was not. Felt-gender incongruence and gender non-contentedness were not significantly associated with first lifetime onset of NSSI or SA among AMAB youth.

Table 3
Logistic regression analyses stratified by sex assigned at birth with gender non-contentedness predicting first-onset self-injurious thoughts and behaviors.

Outcome	OR	95 % CI	*p*
Assigned Female at Birth			
Prospective First Lifetime Onset of Non-Suicidal Self-Injury			
Wave 1 Gender Non-Contentedness	1.33	1.03–1.72	0.028
Wave 1 Depressive Symptoms	1.05	1.02–1.07	0.001
Wave 1 Pubertal Development	2.37	1.77–3.18	<0.001
Wave 1 Suicidal Ideation	1.67	1.01–2.77	0.047
Prospective First Lifetime Onset of Suicidal Ideation			
Wave 1 Gender Non-contentedness	1.23	0.97–1.57	0.089
Wave 1 Depressive Symptoms	1.06	1.04–1.08	<0.001
Wave 1 Pubertal Development	2.10	1.65–2.69	<0.001
Prospective First Lifetime Onset of Suicide Attempts			
Wave 1 Gender Non-Contentedness	1.47	0.99–2.20	0.058
Wave 1 Depressive Symptoms	1.09	1.05–1.14	<0.001
Wave 1 Pubertal Development	2.93	1.59–5.41	0.001
Wave 1 Suicidal Ideation	2.99	1.29–6.93	0.011
Assigned Male at Birth			
Prospective First Lifetime Onset of Non-Suicidal Self-Injury			
Wave 1 Gender Non-Contentedness	1.13	0.65–1.95	0.674
Wave 1 Depressive Symptoms	1.03	0.99–1.06	0.107
Wave 1 Pubertal Development	1.25	0.79–1.98	0.349
Wave 1 Suicidal Ideation	4.29	2.61–7.01	<0.001
Prospective First Lifetime Onset of Suicidal Ideation			
Wave 1 Gender Non-Contentedness	1.80	1.29–2.49	<0.001
Wave 1 Depressive Symptoms	1.06	1.04–1.09	<0.001
Wave 1 Pubertal Development	1.45	1.01–2.08	0.046
Prospective First Lifetime Onset of Suicide Attempts			
Wave 1 Gender Non-Contentedness	1.30	0.60–2.83	0.506
Wave 1 Depressive Symptoms	1.05	1.00–1.11	0.075
Wave 1 Pubertal Development	1.64	0.68–3.94	0.270
Wave 1 Suicidal Ideation	11.48	4.21–31.34	<0.001

Table 2
Bivariate associations of study variables (i.e., dimensions of experienced gender, first-onset self-injurious thoughts and behaviors (SITBs), depressive symptoms, and pubertal development).

Variable	1	2	3	4	5	6	7	8
1. Felt-Gender Incongruence	–	0.50***	0.08***	0.07***	0.18***	0.06***	0.08***	0.05**
2. Gender Non-Contentedness	0.35***	–	0.13***	0.06**	0.20***	0.07***	0.07***	0.06***
3. Wave 1 Depressive Symptoms	0.08***	0.07***	–	0.03	0.15***	0.10***	0.09***	0.08***
4. Wave 1 Pubertal Development	0.06***	0.03	0.03*	–	0.13***	0.10***	0.09***	0.06***
5. Wave 1 Suicidal Ideation	0.12***	0.11***	0.17***	0.05**	–	–	0.07***	0.08***
6. Prospective First Lifetime Onset of Suicidal Ideation	0.03	0.07***	0.08***	0.04*	–	–	0.45***	0.30***
7. Prospective First Lifetime Onset of Non-Suicidal Self-Injury	0.03	0.02	0.04*	0.03	0.11***	0.21***	–	0.31***
8. Prospective First Lifetime Onset of Suicide Attempt	0.04*	0.01	0.06***	0.02	0.12***	0.17***	0.25***	–

Note: Spearman correlations are presented for SITB variables and Pearson correlations for all remaining variables; Results for youth assigned female at birth (AFAB) are presented above the diagonal and results for youth assigned male at birth (AMAB) are presented below the diagonal; Correlations are not presented between Wave 1 suicidal ideation and prospective first lifetime onset of suicidal ideation because individuals reporting suicidal ideation at Wave 1 were excluded to capture only those with first-onset between Wave 1 and Wave 2.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

Table 4
Logistic regression analyses stratified by sex assigned at birth with felt-gender incongruence predicting first-onset self-injurious thoughts and behaviors.

Outcome	OR	95 % CI	*p*
Assigned Female at Birth			
Prospective First Lifetime Onset of Non-Suicidal Self-Injury			
Wave 1 Felt-Gender Incongruence	1.16	1.02–1.32	0.025
Wave 1 Depressive Symptoms	1.05	1.02–1.08	<0.001
Wave 1 Pubertal Development	2.33	1.73–3.14	<0.001
Wave 1 Suicidal Ideation	1.71	1.04–2.83	0.036
Prospective First Lifetime Onset of Suicidal Ideation			
Wave 1 Felt-Gender Incongruence	1.18	1.06–1.32	0.003
Wave 1 Depressive Symptoms	1.06	1.04–1.08	<0.001
Wave 1 Pubertal Development	2.18	1.71–2.79	<0.001
Prospective First Lifetime Onset of Suicide Attempts			
Wave 1 Felt-Gender Incongruence	1.13	0.88–1.45	0.336
Wave 1 Depressive Symptoms	1.09	1.05–1.14	<0.001
Wave 1 Pubertal Development	3.01	1.64–5.51	<0.001
Wave 1 Suicidal Ideation	3.05	1.35–6.90	0.008
Assigned Male at Birth			
Prospective First Lifetime Onset of Non-Suicidal Self-Injury			
Wave 1 Felt-Gender Incongruence	1.23	0.93–1.63	0.144
Wave 1 Depressive Symptoms	1.03	1.00–1.06	0.098
Wave 1 Pubertal Development	1.17	0.73–1.87	0.511
Wave 1 Suicidal Ideation	4.35	2.64–7.18	<0.001
Prospective First Lifetime Onset of Suicidal Ideation			
Wave 1 Felt-Gender Incongruence	1.15	0.90–1.47	0.252
Wave 1 Depressive Symptoms	1.07	1.04–1.09	<0.001
Wave 1 Pubertal Development	1.46	1.01–2.11	0.043
Prospective First Lifetime Onset of Suicide Attempts			
Wave 1 Felt-Gender Incongruence	1.18	0.71–1.95	0.524
Wave 1 Depressive Symptoms	1.06	1.00–1.11	0.036
Wave 1 Pubertal Development	1.52	0.64–3.63	0.343
Wave 1 Suicidal Ideation	9.76	3.75–25.39	<0.001

3. Discussion

The current study examined the relationship between two dimensions of experienced gender and subsequent first onset of SITBs among preadolescents. We found prospective associations between felt-gender incongruence and SI and NSSI among AFAB youth, between gender non-contentedness and NSSI among AFAB youth, and between gender non-contentedness and SI among AMAB youth. To our knowledge, this is the first study to examine dimensions of experienced gender in relation to prospective SITBs in preadolescents. The findings of this study align with prior research conducted with older adolescents that has found elevated risk of SITBs among TGD youth (Thoma et al., 2019). Our study expands on this work by focusing on preadolescents and examining dimensions of experienced gender rather than specific gender identities. The current study suggests that felt-gender incongruence and gender non-contentedness during preadolescence are prospectively associated with SITBs. This builds on cross-sectional findings from Potter et al. (2021), and advances our understanding of the relationship between experienced gender and first-onset NSSI, SI, and SA. Further, these findings suggest the need to examine factors, such as gender minority stress, which may account for these associations.

Dimensions of experienced gender are particularly relevant factors to examine during preadolescence due to puberty onset. Research has demonstrated that early onset of puberty is associated with negative mental health outcomes, including SITBs (Larsson and Sund, 2008; Mensah et al., 2013). Further, research suggests that, for TGD youth, experiences of felt-gender incongruence and gender non-contentedness can become more pronounced as youth navigate pubertal physical and social changes (Steensma et al., 2013). Given that the experiences of TGD preadolescents have been vastly understudied, future research should examine aspects of pubertal development as moderators in the relationships between dimensions of experienced gender and SITBs in this age group.

Gender minority stress theory is a useful framework to interpret the observed associations between dimensions of experienced gender and SITBs and to serve as a guide for next steps in this line of research (Testa et al., 2015). Research utilizing gender minority stress theory indicates that mental health disparities among TGD youth are due to stressors stemming from oppressive sociocultural and political processes rather than psychological issues inherent to their gender identities (McCann et al., 2019; Meyer, 2003). Our findings about elevated SITB risk in preadolescents reporting felt-gender incongruence and gender non-contentedness may be driven by gender minority stressors (Chavanduka et al., 2021; Toomey, 2021). Prior research has shown that, among parents who perceive their children's transgender identities as invalid, many assume that their children are too young to make decisions for themselves (Abreu et al., 2019). For example, preadolescent youth who disclose felt-gender incongruence and gender non-contentedness may encounter rejection or dismissal of their gender experiences by parents or other adults (e.g., teachers, physicians) due to their age, which could contribute to poor mental health outcomes. It is also possible that structural stigma against gender diverse youth through discriminatory laws and social policies creates non-affirming and unsafe family, school, and social contexts that increase risk for SITBs (Hatzenbuehler and Pachankis, 2016). Future research is needed to assess whether the nature and breadth of minority stressors experienced by preadolescents reporting felt-gender incongruence and gender non-contentedness (e.g., discrimination, victimization, gender dysphoria, inadequate support, and lack of access to affirmative health care) may account for the greater SITB risk observed in the current study (Toomey, 2021).

Our study found that higher felt-gender incongruence and gender non-contentedness were especially associated with SITBs among AFAB youth. There were higher rates of both SITBs and diverse gender experiences among AFAB individuals compared to AMAB individuals which may have increased the chances of detecting significant relationships between diverse gender experiences and SITBs among AFAB youth. Pubertal development significantly predicted all first-onset SITBs for AFAB youth and only first-onset SI for AMAB youth. Since the age of puberty onset tends to be earlier in AFAB individuals than AMAB individuals, puberty onset may have contributed to the higher rates of diverse gender experiences and SITBs observed in AFAB youth, and could also be associated with greater experiences of minority stress which might contribute to SITB onset (Steensma et al., 2013). Future research exploring factors associated with diverse gender experience that may differ by sex assigned at birth during preadolescence is warranted.

Studies of SITBs in gender diverse adolescents have shown elevated risk of SA among transgender youth compared to their cisgender peers. In contrast, felt-gender incongruence and gender non-contentedness were not predictors of SA in our sample of preadolescents. Base rates of new lifetime onset of SA in our sample were <1 %. Prior research has shown a marked increase in prevalence of SI around age 10, while prevalence of SA increases around age 12 (Nock et al., 2013). A recent meta-analysis found that, among community samples of preadolescent children, the lifetime prevalence of suicidal ideation was 15.08 % while the lifetime prevalence of suicide attempts was 2.56 % (Liu et al., 2022). The lower base rate of SA may have in part accounted for the lack of associations in the current study. Following these youth into adolescence may yield different findings, with an increase in suicide attempts more likely to occur during this later developmental period.

3.1. Strengths and limitations

The large, national sample included in this study allowed us to examine relationships between dimensions of experienced gender and

SITBs with generalizable results, despite the low base rate of SITBs in preadolescent youth. The longitudinal design also enabled prospective examination of first onset of SITBs, which may point towards further directions for successful early intervention. Lastly, the use of self-report measures for dimensions of experienced gender allows us to capture factors that youth may not have shared with adults in their lives.

Several limitations should also be noted. Although the current study contributes to the important first step of understanding the associations among experienced gender and SITBs in preadolescent children, future research should investigate processes that may explain the higher incidence of SITBs in youth reporting diverse gender experiences or processes that moderate risk such as familial support and minority stressors. Moreover, a larger sample may be required to detect associations with first-onset SA. Although the study's longitudinal design is a strength, the follow-up period was only one year. Further research should explore longer follow-up time frames and include data from multiple waves.

Additionally, despite the use of a national sample, the study population was not fully representative of the racial and ethnic diversity among individuals with diverse gender experiences. For instance, among transgender youth in the United States, 53.7 % are non-White and 31 % are Hispanic, compared to the broader youth population being 48.7 % non-White and 24.8 % Hispanic (Herman et al., 2022). As noted above, our sample featured fewer non-White (33.4 %) and Hispanic (18.8 %) youth, which may limit the generalizability of these findings. As the K-SADS depression module was not administered to youth at the one-year follow-up timepoint, the current study was limited to covarying by parent report of youth depressive symptoms. It is possible that reliance on parent-report of youth depression could have resulted in underreporting of depression (Baumgartner et al., 2020). It is also possible that other factors not included in the current study may be associated with SITBs, including life stress (Liu and Miller, 2014; Stewart et al., 2019) and sleep disturbance (Bernert et al., 2015; Liu et al., 2020). Future studies with larger samples are required to examine a larger number of variables than possible in the current study.

3.2. Clinical implications

Results of the current study suggest the need for assessment and intervention for SITBs among preadolescents experiencing felt-gender incongruence and gender non-contentedness. Prior research has found that earlier onset of SITBs predicts more severe progression of suicidal thoughts and behaviors (Thompson et al., 2012), so prevention and early intervention for SITBs in preadolescents is particularly critical. In addition, it is notable that this sample, which was not recruited to assess gender diverse experiences, reported such high rates of felt-gender incongruence and gender non-contentedness. It is important to note that higher felt-gender incongruence and gender non-contentedness do not necessarily map onto specific gender identities. The frequency at which youth reported these gender experiences indicates the salience of these gender concepts for a much larger portion of youth than those who self-report as transgender (see Table 1). Moreover, incorporating a gender affirming perspective in educating health providers and caregivers about dimensions of gender beyond cisgender or transgender status, as well as the associated increased risk for SITBs, could help increase identification of at-risk youth.

Existing clinical strategies for treating mental health among sexual and gender minority adolescents and young adults utilize affirmative cognitive behavioral therapy (Craig et al., 2021a, 2021b; Pachankis et al., 2015) and mindfulness-based interventions (Iacono et al., 2022). Additionally, research among gender diverse youth has shown that family support is a critical protective factor (Durwood et al., 2021; Rafferty, 2018), which has informed interventions including relational-focused therapy for families (Diamond et al., 2019). Further research is needed to expand this work to preadolescents who report gender non-contentedness and felt-gender incongruence (Hendricks and Testa, 2012). Finally, this study underscores the importance of not dismissing or minimizing the experiences of gender diverse preadolescents.

4. Conclusion

Our results build on existing findings on increased risk of SITBs in gender diverse adolescents by examining prospective risk of SITBs among preadolescents with diverse gender experiences. Assessing felt-gender incongruence and gender non-contentedness allowed us to capture nuances of gender experience in preadolescents that may be missed when inquiring only about specific gender identities. Results from this study suggest that youth experiencing felt-gender incongruence and gender non-contentedness may be at elevated risk of first-onset NSSI and SI. This highlights the importance of increasing attention towards factors that may put youth with diverse gender experiences at risk for SITBs and towards protective factors that may mitigate this risk.

CRediT authorship contribution statement

Sunday Hull: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Julianne Origlio:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Nestor Noyola:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Aude Henin:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Richard T. Liu:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization.

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Richard T. Liu reports a relationship with National Institute of Mental Health that includes: funding grants. Richard T. Liu reports a relationship with Relmada Therapeutics Inc. that includes: consulting or advisory. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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implemented the study and/or provided data but did not necessarily participate in the analysis or writing of this report. This manuscript reflects the views of the authors and may not reflect the opinions or views of the NIH or ABCD consortium investigators.

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Clinical trial registration

N/A

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