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Autistic and neurotypical variance in the appraisal of emotional and interoceptive words

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Introduction: This study investigates how neurotype influences the emotional appraisal of words.
Methods: A total of 131 Spanish-speaking adults in Chile (63 autistic and 68 neurotypical) rated on a 7-point Likert scale 238 Spanish nouns across six affective dimensions: (a) valence, (b) arousal, (c) subjective frequency, (d) association with depression, (e) association with anxiety, and (f) association with anger. Descriptive statistics and Principal Component Analysis were used to identify differences in lexical-affective ratings.
Results: The results revealed consistent group differences in the emotional interpretation of words. Autistic participants tended to assign higher ratings to emotionally intense, concrete, and interoceptively salient terms, particularly those linked to bodily sensations, anxiety, or arousal. Words such as *inquietud* (*uneasiness*), *ducha* (*shower*), and *ansia* (*craving*) were rated as systematically more emotionally charged by autistic participants. In contrast, neurotypical participants favored abstract, socially embedded terms like *admiración* (*admiration*), *soledad* (*loneliness*), and *decepción* (*disappointment*), which rely more heavily on symbolic inference and social scripts. These differences were especially marked in the anxiety and arousal dimensions. Modeling results further confirmed that neurotype predicted systematic variation in ratings across all dimensions, suggesting distinct cognitive-emotional frameworks.
Discussion: The findings support the hypothesis that autistic and neurotypical individuals construct emotional meaning through different experiential systems: one grounded in interoception and perceptual salience, and the other guided by social abstraction. These insights offer implications for inclusive pedagogy, clinical communication, and the design of affective tools in education and therapy. Recognizing neurotype-specific emotional semantics may help reduce miscommunication and foster more adaptive and respectful forms of interaction across neurodivergent and neurotypical populations.

KEYWORDS

autism, affective semantics, emotional lexicon, interoception, lexical categorization, neurodiversity

1 Introduction

Emotional language plays a central role in how individuals categorize, express, and regulate affective experience. While neurotypical models of emotional processing often highlight social cognition and abstract reasoning as core components, neurodiversity-informed perspectives suggest that autistic individuals may rely on alternative

cognitive-affective pathways, rooted in interoceptive awareness and sensory salience (Milton, 2012; Garfinkel et al., 2015; Eccles et al., 2024). From this view, differences in emotion regulation and lexical-emotional preferences are not deficits but expressions of functional neurocognitive variability (Kapp et al., 2013; Pickard et al., 2022).

However, although recent work has begun to explore how autistic individuals engage with emotional content—particularly in relation to bodily sensations, contextual predictability, and alexithymia (Nuske et al., 2024; Bonete et al., 2023)—empirical research examining how these differences shape the appraisal of emotional vocabulary remains limited. Specifically, it is unclear whether autistic individuals consistently favor emotionally intense, perceptually grounded words over socially abstract or relational terms, and how this relates to broader models of embodied cognition and affective meaning-making.

This study addresses that gap by examining whether autistic and neurotypical adults differ in their emotional appraisal of words across six semantic-affective dimensions: valence, arousal, subjective frequency, and associations with depression, anxiety, and anger. A total of 131 Spanish-speaking adults (63 autistic and 68 neurotypical) rated 238 Spanish nouns on a 7-point Likert scale. Using descriptive statistics and Principal Component Analysis, we analyzed whether systematic group-level differences emerged in lexical-affective ratings, and whether these reflected neurotype-specific semantic preferences anchored in interoception and concreteness. This is an exploratory quantitative study conducted in a Latin American context where autism research is scarce (Carcamo, 2025), and it contributes to current theoretical models by integrating findings from emotion regulation, interoceptive cognition, and psycholinguistic appraisal. The following sections present the theoretical framework, methodological approach, and the main results, followed by a discussion of their implications for inclusive pedagogy, clinical communication, and neurodiversity-aware models of language and emotion.

2 Theoretical framework

2.1 Autism spectrum condition (ASC) and emotional regulation

Autism Spectrum Condition (ASC) refers to a constellation of neurodevelopmental variations characterized by differences in social communication, sensory processing, and patterns of interest or behavior. From a neurodiversity-informed perspective, ASC is not solely defined by challenges or dysfunctions but by a distinct cognitive-affective profile shaped through dynamic interactions between biological predispositions, developmental trajectories, and sociocultural contexts (Milton, 2012; Kapp et al., 2013; Pickard et al., 2022). This approach emphasizes the heterogeneity within the spectrum and recognises the ethical implications of clinical language, promoting a shift away from pathologising frameworks toward more inclusive and person-centered understandings.

Emotional regulation—particularly emotional-behavioral self-regulation—plays a central role in everyday adaptation, encompassing the ability to monitor, interpret, and modulate internal states in response to environmental demands (Shaffer et al., 2023; Bonete et al., 2023). This process can be either automatic or intentional and is deeply intertwined with interoceptive awareness, sensory integration, and social cognition. In autistic individuals, emotional regulation challenges do not arise uniformly but often reflect specific interactions between bodily awareness, contextual predictability, and the availability of adaptive strategies.

Rather than conceptualising emotional dysregulation as a dysfunction, contemporary frameworks point to differentiated styles of regulation grounded in unique sensory and cognitive processing pathways (Eccles et al., 2024; Garfinkel et al., 2015). For example, reduced access to interoceptive cues or difficulties in naming internal states may contribute to patterns of alexithymia and affective disconnection in some autistic individuals—though these phenomena should not be conflated with autism itself. Moreover, sensory sensitivities or a heightened physiological arousal baseline can influence emotional reactivity, recovery time, and behavioral expressions of distress.

Neurobiological research supports these perspectives, highlighting atypical activation patterns in regions such as the amygdala, insula, and prefrontal cortex—structures involved in emotion regulation, salience detection, and self-referential processing (Nuske et al., 2024; Behrouzi et al., 2025). However, these differences are best understood not as pathological markers but as neural correlates of lived affective diversity. They help explain, for instance, the pronounced role of bodily cues, sensory intensity, or context-specific triggers in emotional experience among autistic populations.

Recent interventions targeting emotional regulation in autism have begun to reflect these insights. Mindfulness-based approaches, interoceptive training, and emotion-focused psychoeducation have demonstrated effectiveness in enhancing self-awareness and flexible response strategies (Özyurt et al., 2024). Importantly, interventions that center on body-based emotional literacy show particular promise for increasing emotional granularity, enabling autistic individuals to more precisely identify and categorize their emotional states.

Despite growing advances, current literature still underrepresents how cultural, linguistic, and contextual variables shape emotional development in autism. Similarly, the interaction between co-occurring conditions—such as anxiety or alexithymia—and emotion processing remains insufficiently explored. Addressing these gaps is essential for developing inclusive, individualized support strategies that align with the diverse emotional architectures of autistic individuals.

2.2 Cognitive and emotional models in autism

Traditional cognitive models have contributed valuable insights into the diversity of processing styles in Autism Spectrum Condition (ASC). The Weak Central Coherence (WCC) theory suggests a bias toward detail-focused, local processing over global, contextual integration (Happé and Frith, 2006), while the Executive Function (EF) hypothesis points to variations in cognitive flexibility and attentional control (Hill, 2004). Similarly, the Affective Theory of Mind (ToM) highlights differences in understanding others' emotional states, often linked to atypical activity in brain areas associated with social cognition (Shaffer et al., 2023). While each of these models captures partial dimensions of autistic experience, they remain insufficient to explain the affective and bodily underpinnings of emotional language processing.

To address this gap, the Interoception Model offers a more integrative framework. Interoception refers to the perception of

internal bodily signals—such as changes in heart rate, muscle tension, or visceral arousal—and plays a fundamental role in the construction of emotional meaning (Eccles et al., 2024; Garfinkel et al., 2015). Differences in interoceptive sensitivity or awareness have been consistently documented in autistic individuals and are associated with phenomena such as alexithymia, emotional dysregulation, and heightened somatic reactivity. Crucially, these interoceptive differences do not merely represent perceptual variation, but shape how emotions are experienced, identified, and verbally represented.

Within this framework, emotional regulation is grounded not in top-down cognitive control, but in the embodied registration of internal states. When interoceptive awareness is limited or inconsistent, emotional experiences may be more difficult to name, differentiate, or contextualize—this may hypothetically lead to a preference for tangible, intense, and concrete terms when categorizing affective vocabulary, although direct evidence linking interoception to lexical preferences is limited. This interpretation is theoretically motivated by research relating interoceptive awareness to emotional granularity, labeling, and access to affective concepts (Murphy et al., 2017; Garfinkel et al., 2015; Kinnaird et al., 2020).

This profile is not inherently deficient; rather, it reflects variation in sensory–cognitive pathways consistent with neurodiversity approaches that emphasize difference over deficit.

From this perspective, classical models such as WCC or ToM can be reinterpreted as secondary modulators of how internal states are cognitively integrated. For example, a preference for literal or object-based language may stem not only from attentional styles (as in WCC), but from the way emotions are primarily constructed through bodily cues. Likewise, challenges in social–emotional inference (ToM) may be shaped by the foundational difficulty of recognizing one's own physiological-emotional signals. This theoretical integration aligns with emerging findings in autism research and neurophenomenology, which emphasize the centrality of the body in shaping affective and semantic experience. Positioning interoception at the core of emotional semantics in autism offers a generative path for research and practice, shifting the focus from deficit models toward neurotype-specific pathways of meaning-making.

2.3 The role of emotion in autism

Research indicates heterogeneous arousal profiles in autism, encompassing both heightened sensitivity and lowered responsiveness (including sensory-seeking presentations) (Ben-Sasson et al., 2009). Stimming behaviors are frequently interpreted as self-regulatory strategies that rely on rhythmic and sensory-based regulation (Kapp et al., 2019). Neuroimaging and psychophysiological studies further point to variability in salience and arousal regulation across autistic populations (Green et al., 2015). We build on this literature while avoiding deficit framings and without attributing specific neural patterns to any single study.

This orientation toward sensorial and interoceptive emotional anchors has implications for emotion regulation. Autistic individuals may experience heightened arousal in response to internal or external stimuli, yet have difficulty recognizing or labeling these bodily states—particularly when co-occurring traits such as alexithymia are present. As a result, emotional regulation strategies may be less reliant on cognitive reappraisal and more rooted in rhythmic, environmental, or sensory-based regulation mechanisms. These experiences are often misunderstood as behavioral dysregulation, when in fact they reflect a need for support in interpreting internal states and linking them to emotional concepts.

Importantly, emotional salience also impacts language use and semantic categorization. Autistic individuals may assign greater lexical weight to words that map onto direct bodily sensations (e.g., *inquietud*, *ansia*) or physical experiences, rather than socially mediated affective terms (e.g., *admiración*). These preferences suggest a semantic structure shaped by embodied emotional processing—where language becomes a reflection of how emotion is registered and organized internally. Neurocognitive differences in interoception, attention, and salience attribution can therefore shape not only emotional experience, but also the lexical-emotional categories used to describe it.

Given these insights, interventions aimed at supporting emotional understanding in autism must go beyond generalist programs and address the specific ways in which autistic individuals process, experience, and express emotion. Evidence-based approaches such as Interoceptive Awareness Training, structured sensory-based therapies, and frameworks like SCERTS—which integrate emotional expression with communicative intent and regulation in natural contexts—have shown promise. These interventions respect neurodivergent modes of emotional meaning-making and offer tools to support more precise emotional communication without imposing neurotypical norms.

By acknowledging the bodily, perceptual, and semantic specificities of emotional processing in autism, we move toward a more inclusive understanding of emotion—one that recognizes diversity not as deviation, but as a valid and valuable expression of human affective life.

2.4 Emotional word processing in autistic individuals

Emotional word processing—the way individuals perceive, interpret, and assign meaning to emotionally charged lexical items—is central to language comprehension and socio-emotional functioning. In autistic individuals, a growing body of evidence suggests the presence of distinct semantic-affective patterns, often characterized by a preference for emotionally intense and concrete words over abstract or socially embedded terms. Understanding these preferences is key to explaining the ways in which emotion is linguistically categorized in autism.

Autistic people have been observed to showed higher ratings or stronger associations with emotionally concrete words, often linked to bodily or sensory experience (e.g., *fear*, *inquietud*), and less engagement with abstract or inferential emotional terms, such as *admiration* or *regret* (Pedregal and Heaton, 2021). This tendency aligns with models that emphasize local, detail-focused processing, but it also reflects a semantic structure grounded in embodied salience—a focus on affective meaning arising from interoceptive or perceptual cues rather than social abstraction.

A range of methodologies support this pattern. Behavioral studies have found consistent preferences for emotion-laden words that carry sensory immediacy. Eye-tracking data reveal longer fixations and delayed saccades when autistic individuals process emotionally ambiguous or abstract terms, indicating greater cognitive demand (Yeh et al., 2024). Electrophysiological studies have shown differences

in the N400 component, a marker of semantic integration, particularly when participants process emotional words lacking perceptual grounding. Neurophysiological evidence further supports heightened autonomic responses—such as skin conductance or heart rate variability—when processing emotionally intense words, especially those with high arousal (Eccles et al., 2024).

These converging findings raise a central question: Do autistic individuals systematically categorize emotional words according to different internal criteria—specifically, interoceptive salience, concreteness, and emotional arousal—compared to neurotypical peers? This question underpins the present study. The aim is not to pathologize these differences, but to explore whether autistic individuals exhibit stable, measurable preferences in how they emotionally appraise language, and whether those preferences can be interpreted as part of a neurotype-specific semantic architecture.

In this context, the construct of alexithymia—difficulty in identifying and verbalizing emotions—gains relevance. While not exclusive to autism, alexithymia is prevalent among a subset of autistic people and may modulate how internal states are mapped onto language. However, it is crucial to differentiate between traits of autism and the influence of co-occurring conditions. Similarly, constructs such as emotional valence (positive–negative) and arousal (intensity of activation) are not just theoretical categories—they are operationalized in this study as dimensions in which emotional word categorization will be empirically examined. The inclusion of depression, anxiety, and anger as reference dimensions responds to prior evidence suggesting their salient affective load and differential representation in autistic populations.

In summary, emotional word processing in autism represents a distinct cognitive-emotional pathway, one that privileges bodily and experiential cues over abstract social conventions. This study investigates whether such preferences manifest systematically across lexical-emotional categories and whether these patterns differ consistently between autistic and neurotypical individuals. By doing so, it aims to contribute not only to the understanding of language-emotion interaction, but also to the design of inclusive, semantically attuned communication and intervention strategies.

Understanding how autistic adults appraise emotion words is directly relevant for clinical communication and inclusive pedagogy: aligning linguistic choices with interoceptive and socio-cognitive profiles may reduce miscommunication and support practice in Spanish-speaking contexts, where empirical evidence is scarce.

3 Methods

3.1 Participants

The study involved 131 adult Spanish-speaking participants, comprising 63 autistic individuals and 68 neurotypical controls. Autistic participants had been formally diagnosed with Autism Spectrum Condition (ASC) by certified clinicians, including psychologists, psychiatrists, or neurologists, in accordance with DSM-5 criteria. Diagnoses were confirmed through multidisciplinary evaluations, typically involving structured interviews or clinical reports issued by public or private healthcare systems. Participants in the ASC group reported no history of intellectual disability, neurological illness, or psychiatric diagnoses beyond autism.

All participants were between 18 and 45 years of age (M = 28.7, SD = 6.4) and self-identified as native Spanish speakers. The neurotypical control group was matched with the ASC group in terms of age, gender, and education level. Participants in the control group reported no history of developmental, neurological, or psychiatric conditions. However, no standardised screening tools (e.g., Autism-Spectrum Quotient, SCL-90) were used to rule out subclinical traits, which is noted as a limitation in the interpretation of the findings. Recruitment took place through university networks, autism organizations, and social media groups in Chile. Participants who expressed interest online were subsequently invited to attend supervised sessions held in university computer laboratories, where all data were collected under supervision.

3.2 Materials

The lexical corpus consisted of 238 Spanish nouns, selected and adapted from previously validated affective norms databases (Dueñas et al., 2010). The corpus was restricted to nouns to minimize morpho-syntactic variability across dimensions. Items were adapted from established Spanish affective norms with orthographic and semantic checks for Chilean Spanish to preserve natural usage and equivalence. These words were chosen to encompass a broad range of emotional and semantic content, with relevance to both everyday communication and clinical constructs. Each word was evaluated by participants along six dimensions: (1) valence (positive–negative emotional tone), (2) arousal (emotional intensity), (3) subjective frequency (perceived familiarity), (4) association with depression, (5) association with anxiety, and (6) association with anger. All six dimensions were rated on 7-point Likert-type scales ranging from 1 ("minimal intensity or association") to 7 ("maximum intensity or association").

The three disorder-related dimensions—depression, anxiety, and anger—were included based on prior evidence of their salience in autistic populations, both clinically and in language processing studies (Lindert et al., 2021; Zainal and Newman, 2023). These dimensions were operationalized specifically for this study and underwent preliminary piloting with an independent sample to ensure clarity of instructions, appropriate scale usage, and variability in responses.

3.3 Procedure

Participants completed the task online in a controlled lab environment after electronic consent and a brief tutorial with practice items. They rated 238 nouns on six dimensions presented in randomized order. The task was completed in two sessions of approximately 45 min (if needed) with self-administered breaks *ad libitum* to manage fatigue. The interface required a response for every item; only complete datasets were recorded.

3.4 Data analysis

We first calculated the mean ratings for each word across participants within each group for all six dimensions. These group-level means served as the input for identifying general patterns of emotional and semantic word appraisal. To explore the

structure underlying these evaluations, we applied Principal Component Analysis (PCA) to the matrix of mean ratings, treating the six dimensions as input variables. The PCA aimed to uncover latent components that accounted for the variance in emotional word evaluations and to determine whether these components differed in salience or structure across neurotypes. All analyses were performed in RStudio. Data visualization was conducted using the ggplot2 package, and the PCA was implemented via the stats base package. Outputs included component loadings, scree plots, and heatmaps of lexical-emotional profiles for both groups. Word lists were also rank-ordered by dimension to highlight words preferred or avoided by each group.

To statistically evaluate group differences in the appraisal of individual words, we fitted a series of linear mixed-effects models (LMMs), one for each of the six affective dimensions. Each model included group (autistic vs. neurotypical) as a fixed effect and incorporated random intercepts for participants and words to account for by-subject and by-item variability. Neurotypical participants were used as the reference group. For better visualization and clarity of interpretation, the six models were organized into two sets: one for negative affective dimensions (anxiety, anger, and depression) and another for positive and lexical dimensions (valence, activation, and subjective frequency). All models were estimated using restricted maximum likelihood (REML), with the Satterthwaite approximation applied to derive degrees of freedom and significance levels. Model estimation and tabulation were performed using the *lme4*, *lmerTest*, and *sjPlot* packages in R.

For descriptive visualization, we identified the six highest and six lowest words per group and dimension by ranking group-mean ratings computed in R. Ties were resolved by lower within-group standard deviation, then alphabetical order if needed. These panels are illustrative only and do not constitute additional hypothesis tests. In figures and captions, 'preferred' denotes items with relatively higher group-mean ratings within a dimension, and 'avoided' denotes relatively lower ratings.

3.5 Ethical considerations

This study was conducted in line with the ethical principles of the Declaration of World Medical Association, (2025) and the guidelines of the American Psychological Association (2010). Prior to participation, all individuals were provided with clear, accessible information regarding the study and gave their informed consent electronically. Participation was voluntary and anonymous, and no personally identifying or sensitive data were collected. Participants were not financially compensated. The study posed minimal risk and did not involve any clinical intervention. Data collection and storage complied with institutional data protection standards.

4 Results

Principal Component Analysis (PCA) biplots were used to illustrate participant distribution based on ratings across the six lexical-emotional dimensions and to reveal group differences. Figure 1 displays Principal Component 1 (horizontal axis) and Principal Component 2 (vertical Axis).

In Figure 1 each point represents a participant—autistic (red circles) or neurotypical (blue triangles)—and their position is determined by the linear combination of principal components derived from the dataset. Principal Component 1 (horizontal axis) captures the largest portion of variance and is primarily driven by negative affective dimensions, including depression, anxiety, and anger, which project strongly and positively along this axis. Principal Component 2 (vertical axis) is influenced mainly by subjective frequency and activation. The biplot reveals a clear group-level

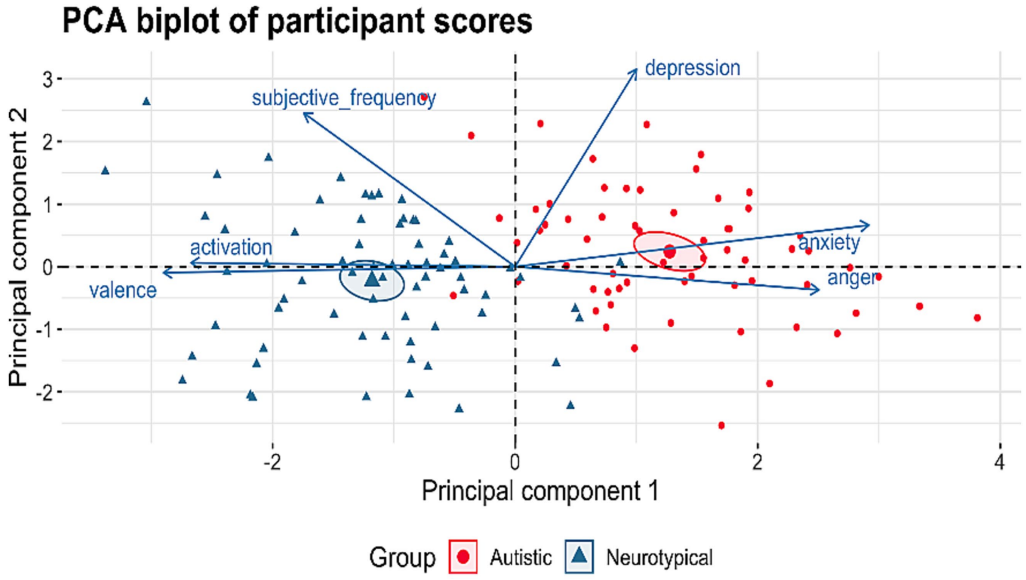

FIGURE 1
PCA biplot of participant scores across lexical-emotional dimensions.

distinction: autistic participants cluster more tightly on the positive end of Component 1, indicating stronger associations with negative emotional dimensions, whereas neurotypical individuals are more widely dispersed, particularly along Component 2, and show relatively stronger alignment with neutral or lexical properties such as valence and frequency. Although exploratory in nature, this visualization provides evidence of neurotype-specific profiles in emotional lexical appraisal, suggesting that autistic individuals structure the emotional space in a way that is more intensely driven by affective salience, while neurotypical individuals display a broader range of emotional-linguistic mappings. The biplot thus complements the inferential findings by visually reinforcing the presence of qualitative differences in lexical-emotional processing between groups.

We proceeded to determine differences between autistic and neurotypical individuals across six lexical-emotional dimensions for 26 emotionally salient Spanish nouns. Figure 2 displays a heatmap which visually represents these differences across lexical-emotional dimensions: valence, subjective frequency, depression, anxiety, anger, and activation.

Each tile in Figure 2 represents the group difference in mean ratings for a given word and dimension, with red indicating higher scores by autistic participants and blue indicating higher scores by neurotypical participants. The color gradient ranges from −2 to +2, capturing subtle and pronounced divergences in emotional appraisal. Several words stand out for their group-specific emotional salience: *inquietud* (*uneasiness*) shows marked differences in anxiety (+1.41) and depression (+1.29), while *jarrón* (*jar*) registers a + 1.35 difference in anxiety, and *sobresalto* (*scare*) scores consistently higher for autistic individuals across anxiety (+1.18), anger (+0.97), and activation (+0.84). Conversely, neurotypical individuals showed higher ratings on valence for abstract/social items such as adoración (adoration), whereas autistic participants showed higher activation for concrete items such as ducha (shower) (activation: −1.12), *desmoralización* (*demoralization*) (activation: −1.09), and *adoración* (*adoration*) (valence: −1.02) more highly, suggesting a stronger resonance with abstract or socially embedded concepts. Other items such as *venganza* (*revenge*) (anger: +1.01) and *ansia* (*craving*) (depression: +1.22) further highlight the autistic group's inclination toward emotionally intense or interoceptively grounded words. In contrast, items like *ordenador* (*laptop*) or *maqueta* (*model*) show minimal group differentiation, suggesting relative emotional neutrality. The visual distribution supports the broader pattern of neurotype-specific lexical-emotional processing: autistic individuals tend to assign greater intensity to concrete and affect-laden terms, while neurotypical individuals are more responsive to valenced, socially constructed or metaphorical lexical items. These results reflect underlying cognitive-emotional mechanisms, including interoceptive awareness, emotional granularity, and differences in contextual integration, and offer empirical grounding for neurodivergent-sensitive models of lexical semantics and affective language processing.

We continued to examine which lexical items were the lowest-rated by neurotypical and autistic participants across the six evaluated dimensions. Figure 3 shows the results.

Each subplot in Figure 3 highlights the bottom six words per group, enabling a comparative view of group-specific lexical aversions or emotional disconnections. In the *activation* panel, autistic individuals consistently rated neutral and physical nouns such as *ducha* (*shower*), *estante* (*shelf*), and *sonrisa* (*smile*) with low intensity (means ≈ 5.9, on a 1–7 scale, these values are not low in absolute terms; our interpretation focuses on relative group contrasts rather than clinical thresholds), while neurotypical participants showed lowest scores for emotionally complex terms like *suicidio* (*suicide*) and

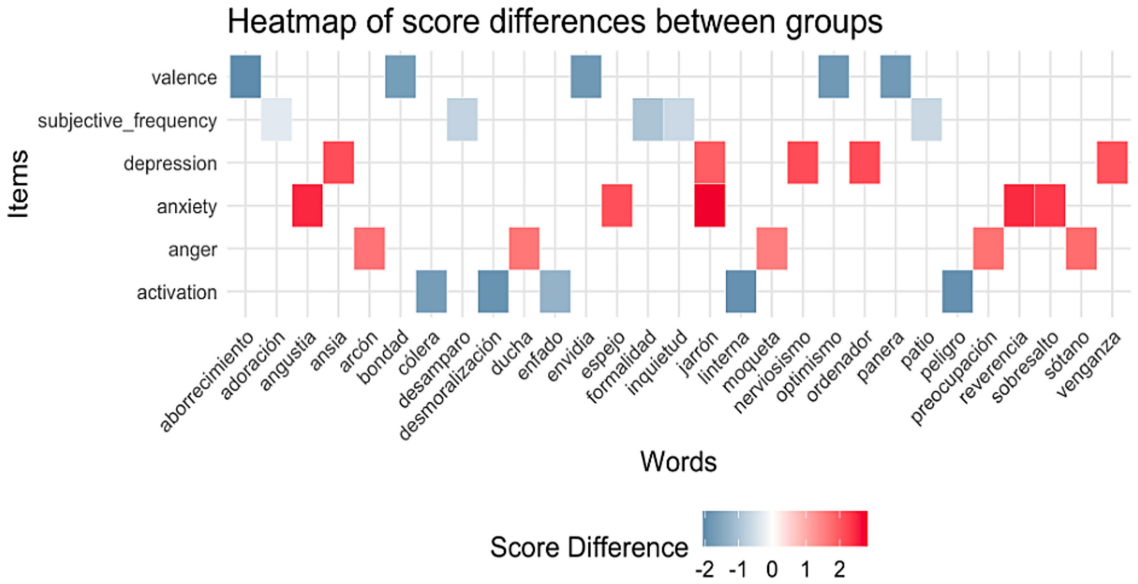

FIGURE 2
Heatmap of mean score differences between autistic and neurotypical participants. Spanish words translated into English are: *aborrecimiento (abhorrence), adoración (adoration), angustia (anguish), ansia (craving), bronca (anger), cólera (fury), desamparo (helplessness), desmoralización (demoralization), ducha (shower), enfado (annoyance), envidia (envy), espejo (mirror), formalidad (formality), inquietud (uneasiness), jarrón (jar), linterna (torch/lantern), moqueta (carpet), nerviosismo (nervousness), optimismo (optimism), ordenador (laptop), panera (breadbasket), patio (backyard), preocupación (worry), reverencia (reverence), sobresalto (scare), sótano (basement), venganza (revenge).*

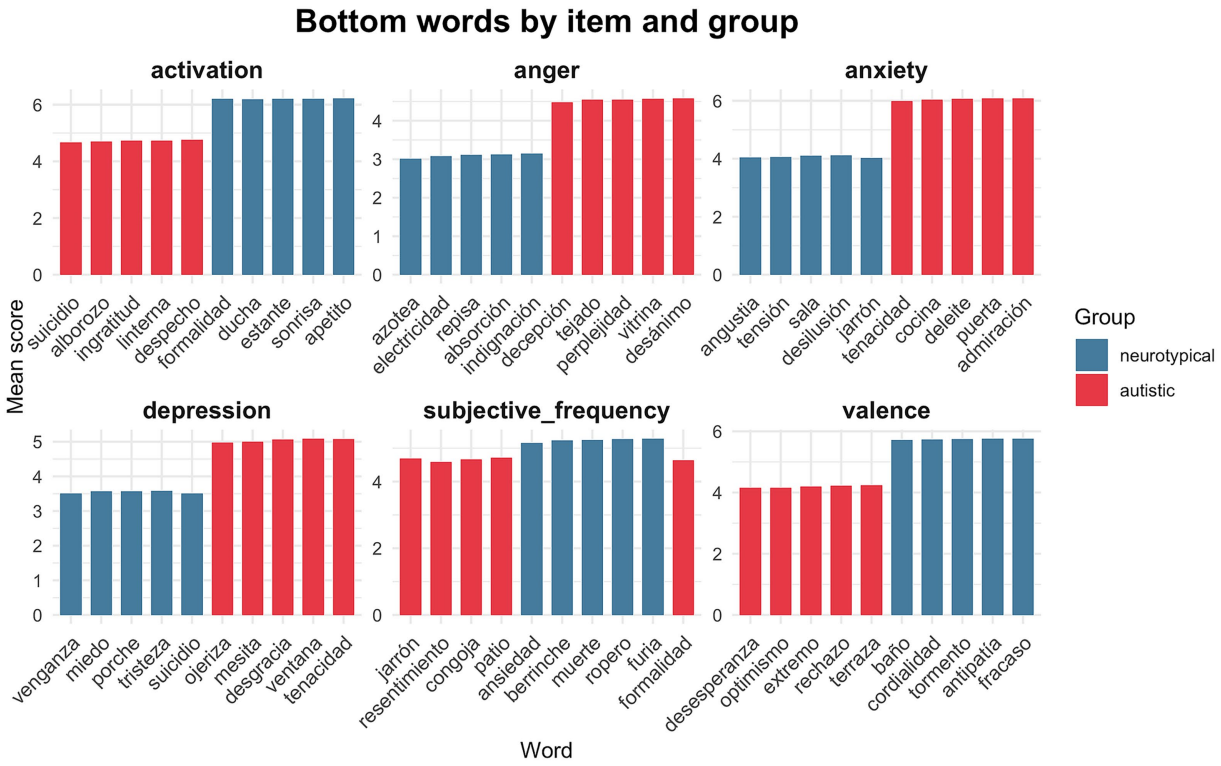

FIGURE 3
Lowest-rated lexical items by neurotypical and autistic participants. Spanish words translated into English are: *suicidio (suicide), alborozo (joy), ingratitud (ingratitude), linterna (torch/lantern), despecho (spite), formalidad (formality), ducha (shower), estante (shelf), sonrisa (smile), apetito (appetite), azotea (rooftop), electricidad (electricity), repisa (shelf), aborrecimiento (abhorrence), indignación (indignation), decepción (disappointment), techo (roof), perplejidad (perplexity), desánimo (discouragement), angustia (anguish), tensión (tension), sala (room), desilusión (disappointment), jarrón (jar), tenacidad (tenacity), cocina (kitchen), delito (crime), puerta (door), admiración (admiration), venganza (revenge), miedo (fear), pinche (kitchen helper/peon), tristeza (sadness), misa (mass), desgracia (disgrace), resentimiento (resentment), congoja (distress), patio (backyard), berrinche (tantrum), muleta (crutch), furia (fury), desesperanza (hopelessness), optimismo (optimism), extremo (extreme), rechazo (rejection), terraza (terrace), lazo (bond), cordialidad (cordiality), tornadizo (fickle), antipatía (antipathy), fracaso (failure).*

alborozo (*joy*) (means ≈ 4.5). In the *anger* dimension, autistic participants assigned low scores to emotionally subtle or socially charged words such as *indignación* (*indignation*), *decepción* (*disappointment*), whereas neurotypical individuals showed lower associations with anger for object-based or spatial nouns such as azotea (rooftop) and electricidad (electricity). In *anxiety*, autistic participants showed their lowest ratings for emotionally abstract or socially coded items like *tenacidad* (*tenacity*) and *puerta* (*door*), while neurotypical individuals scored *angustia* (*anguish*) and *desilusión* (*disappointment*) as least anxiety-inducing. For *depression*, autistic individuals rated low-frequency emotional terms like *desgracia* (*disgrace*) and *tenacidad* (*tenacity*) at the lower end, while neurotypical participants assigned the lowest depression values to emotionally intense terms such as *venganza* (*revenge*) and *tristeza* (*sadness*), indicating potential emotional disengagement or avoidance. In *subjective frequency*, autistic participants rated rare or socially peripheral terms such as *congoja* (*distress*), *patio* (*backyard*), and *berrinche* (*tantrum*) as less familiar, whereas neurotypical participants reported the lowest frequency for emotionally nuanced words like *furia* (*anger*) and *formalidad* (*formality*). Lastly, in *valence*, autistic individuals rated emotionally negative or ironic words such as *desesperanza* (*hopelessness*), *rechazo* (*rejection*), and *optimismo* (*optimism*) as lowest in positivity, while neurotypical participants showed lowest valence ratings for socially ambiguous or emotionally flat items such as *cordialidad* (*cordiality*), *tornadizo* (*fickle*), and *fracaso* (*failure*). Together, these subplots visualize divergent emotional-linguistic aversions between groups, reflecting neurotype-specific lexical disaffinities shaped by affective processing styles, contextual decoding, and possibly interoceptive granularity.

After calculating the lowest-rated items, we proceeded to calculate the top-rated lexical items. Figure 4 displays the highest-rated lexical items by group (autistic in blue; neurotypical in red) across the six dimensions of analysis—activation, anger, anxiety, depression, subjective frequency, and valence—revealing neurotype-specific preferences for emotionally salient vocabulary.

Figure 4 shows that in terms of *activation*, neurotypical participants assigned top ratings to affective and contextually rich words such as *admiración* (*admiration*), *agobio* (*burden*), *cólera* (*fury*), and *peligro* (*danger*) (mean scores > 6.2), whereas autistic participants favored sensory or spatially grounded items like *litera* (*bunk*), *terraza* (*terrace*), and *alfombra* (*carpet*) (means ≈ 5.5). For *anger*, neurotypical individuals rated social and moral concepts like *Victoria* (*victory*), *persecución* (*persecution*), and *reverencia* (*reverence*) lowest within the top items, while autistic participants rated emotion-loaded terms like *alegría* (*joy*), and *oscuridad* (*obscurity*) more highly (means > 5.5), indicating divergent conceptual associations with anger-related vocabulary. In *anxiety*, autistic individuals strongly endorsed items such as *jarrón* (*jar*), *espanto* (*fright*), *insomnia* (*insomnia*), and *taburete*

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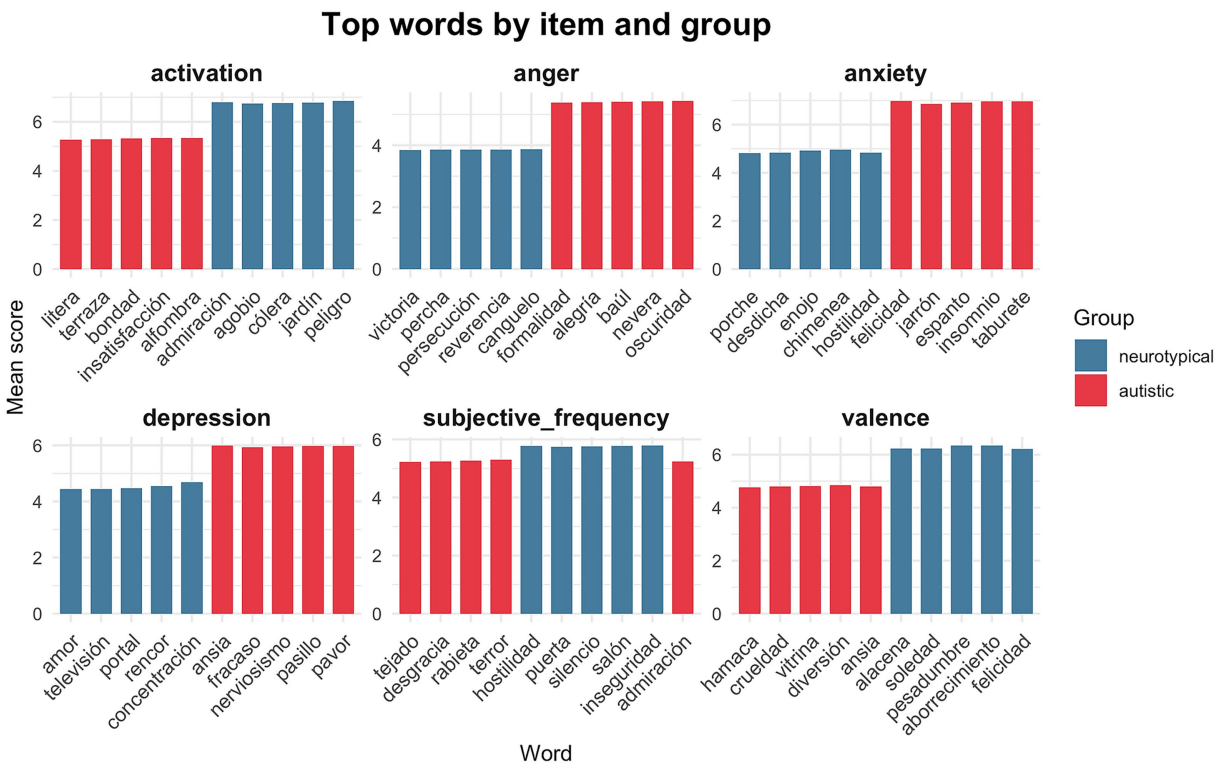

FIGURE 4
Top-rated lexical items by neurotypical and autistic participants. Spanish words translated into English are: litera (bunk), terraza (terrace), bondad (goodness), insatisfacción (dissatisfaction), admiración (admiration), agobio (burden), cólera (fury), jardín (garden), peligro (danger), victoria (victory), persecución (persecution), reverencia (reverence), rencor (resentment), formalidad (formality), alegría (joy), baúl (trunk), oscuridad (obscurity), porche (porch), desdicha (misfortune), enojo (anger), chimenea (chimney), hostilidad (hostility), felicidad (happiness), jarrón (jar), espanto (fright), insomnio (insomnia), taburete (stool), amor (love), televisión (television), portal (portal), concentración (concentration), ansia (craving), fracaso (failure), nerviosismo (nervousness), pasillo (corridor), pavor (dread), tejado (roof), desgracia (disgrace), rabieta (tantrum), terror (terror), pulsera (bracelet), silencio (silence), alacena (cupboard), soledad (loneliness), hamaca (hammock), crueldad (cruelty), diversión (fun), pesadumbre (sorrow), aborrecimiento (abhorrence).

(*stool*) (means > 6.4). Items such as *baúl* (trunk), *taburete* (stool), and *chimenea* (chimney) showed differential group ratings, and are reported descriptively without inferring specific emotional content. The *depression* panel shows autistic participants rating highly concrete or affectively overwhelming words such as *ansia* (*craving*), *fracaso* (*failure*), *nerviosismo* (*nervousness*), and *pavor* (*dread*), whereas neurotypical participants' top-rated items were less affectively extreme [e.g., *amor* (*love*), *televisión* (*television*), *portal* (*portal*)]. In terms of *subjective frequency*, neurotypical individuals attributed higher familiarity to socially relevant or emotionally resonant words like *silencio* (*silence*), *inseguridad* (*insecurity*), and *pulsera* (*bracelet*), while autistic participants rated as highly familiar terms such as *tejado* (*roof*), *rabieta* (*tantrum*), and *hostilidad* (*hostility*), reflecting a possibly more sensorimotor or emotionally precise lexicon. Lastly, in *valence*, neurotypical individuals assigned highest valence to emotionally complex or ambivalent terms such as *soledad* (*loneliness*), *pesadumbre* (*sorrow*), *aborrecimiento* (*abhorrence*), and *felicidad* (*happiness*), while autistic participants rated terms like *hamaca* (*hammock*), *crueldad* (*cruelty*), *diversión* (*fun*), and *ansia* (*craving*) with higher emotional valence, highlighting a distinct interpretation of emotional polarity. Overall, this figure reveals that autistic and neurotypical individuals assign high emotional or contextual value to divergent lexical items, suggesting differential salience mapping and affective resonance that reflect distinct neurocognitive profiles.

To gain deeper insights, we then analyzed the linguistic preferences and aversions of autistic and neurotypical individuals. For autistic participants, the highest-rated lexical items in the "Preferred" category frequently correspond to emotionally intense or tangible concepts, as shown in Figure 5.

Under the anxiety dimension, lexical items such as *felicidad* (*happiness*, mean score: 6.99), *taburete* (*stool*, 6.97), and *insomnio* (*insomnia*, 6.97) demonstrated the strongest preference. Similarly, under activation, *alfombra* (*carpet*) and *insatisfacción* (*dissatisfaction*) both achieved a mean score of 5.34, followed closely by *bondad* (*goodness*, 5.33). These patterns suggest a predilection for lexical items that evoke concrete or affectively salient imagery.

Conversely, autistic participants exhibited strong aversions to certain lexical items. For example, under the activation dimension, *suicidio* (*suicide*, 4.66), *alborozo* (*joy*, 4.70), and *ingratitud* (*ingratitude*, 4.73) were among the least preferred. The aversion to emotionally charged or socially complex terms, such as *decepción* (*disappointment*, 4.48) under anger and *desesperanza* (*hopelessness*, 4.15) under valence, further underscores this pattern.

Neurotypical individuals, in contrast, demonstrated a preference for lexical items associated with abstract or socially meaningful constructs. Under activation, *peligro* (*danger*, 6.85), *admiración* (*admiration*, 6.80), and *jardín* (*garden*, 6.77) were the most preferred lexical items. Additionally, valence-related items such as *aborrecimiento*

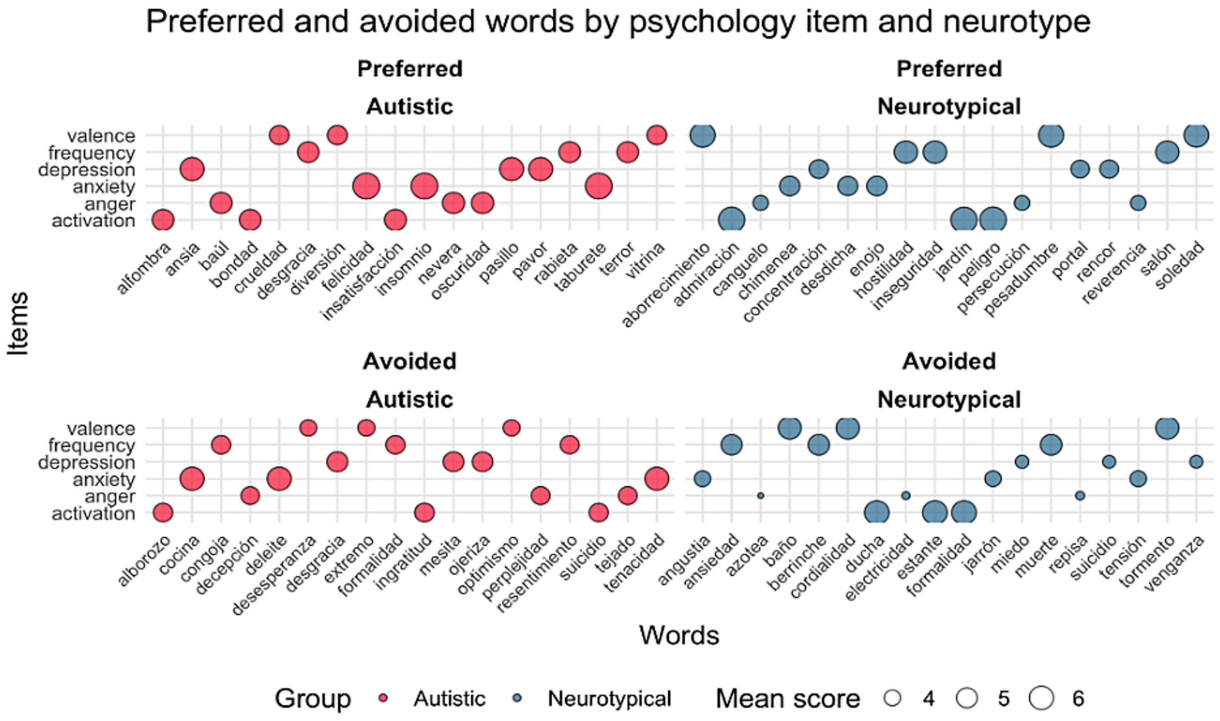

FIGURE 5
Preferred and avoided words by psychology item and neurotype. Spanish words translated into English are: alfombra (carpet), ansia (craving), bondad (goodness), crueldad (cruelty), diversión (fun), desgracia (disgrace), felicidad (happiness), insatisfacción (dissatisfaction), inconformidad (nonconformity), insomnio (insomnia), nerviosismo (nervousness), oscuridad (obscurity), pasillo (corridor), pavor (dread), rabieta (tantrum), taburete (stool), terror (terror), vitrina (display case), aborrecimiento (abhorrence), admiración (admiration), alacena (cupboard), ambigüedad (ambiguity), chimenea (chimney), concentración (concentration), desdicha (misfortune), enojo (anger), hostilidad (hostility), inseguridad (insecurity), jardín (garden), persecución (persecution), portal (portal), pesadumbre (sorrow), reverencia (reverence), soledad (loneliness), alborozo (joy), cocina (kitchen), congoja (distress), decepción (disappointment), debilidad (weakness), desesperanza (hopelessness), estante (shelf), formalidad (formality), ingratitud (ingratitude), misa (mass), optimismo (optimism), perplejidad (perplexity), resentimiento (resentment), suicidio (suicide), tenacidad (tenacity), ansiedad (anxiety), azotea (rooftop), baño (bathroom), berrinche (tantrum), cordialidad (cordiality), electricidad (electricity), miedo (fear), muerte (death), sótano (basement), tormento (torment), venganza (revenge).

(*abhorrence*, 6.35), *pesadumbre* (*sorrow*, 6.34), and *soledad* (*loneliness*, 6.23) received the highest scores, indicating a propensity for terms with social or emotional significance. On the other hand, neurotypical participants displayed aversions to lexical items related to concrete or non-social concepts. Under anger, for instance, azotea (rooftop, 3.02), *electricidad* (*electricity*, 3.07), and *repisa* (*shelf*, 3.11) had the lowest mean scores. Notably, the lexical item *suicidio* (*suicide*) was strongly avoided by both groups, with mean scores of 4.66 for autistic and 3.51 for neurotypical individuals, reflecting a shared aversion to profoundly negative emotional stimuli. This pattern is consistent with the LMM estimates indicating systematically higher anger associations in the autistic group (see below).

To examine how neurotype influences the affective appraisal of words, we fitted linear mixed-effects models comparing the evaluations made by autistic and neurotypical participants across six emotional and lexical dimensions. The results are presented in two separate tables: Table 1 reports on negative affective dimensions (anxiety, anger, and depression), while Table 2 focuses on positive and lexical dimensions (valence, activation, and subjective frequency). Each table is followed by a detailed interpretation of the most salient effects, highlighting statistically robust and conceptually meaningful differences between groups.

Linear mixed-effects models were fitted to evaluate the extent to which neurotype (autistic vs. neurotypical) predicted differences in the evaluation of emotionally negative words. All three negative affective dimensions—anxiety, anger, and depression—showed statistically significant effects of group, with autistic participants assigning consistently higher ratings than neurotypicals. For anxiety, the fixed effect of group was 2.00, 95% Confidence Interval (CI) [1.96, 2.03], with a t-statistic of 119.82, $p < 0.001$. This indicates that, on average, autistic participants rated anxiety-related words two full points higher on a 7-point scale than neurotypical participants. The intercept for neurotypicals was 4.50, suggesting a mid-level baseline of anxiety perception in the control group. In the case of anger, autistic participants again provided significantly higher ratings (Estimate = 1.48, 95% CI [1.45, 1.51], $t = 89.66$, $p < 0.001$), relative to a neurotypical baseline intercept of 3.51. This suggests that, while both groups viewed anger-related words as less emotionally salient overall compared to anxiety terms, autistic individuals still rated these terms as markedly more intense. For depression, a nearly identical pattern emerged: autistic participants gave higher ratings (Estimate = 1.48, 95% CI [1.45, 1.52], $t = 88.81$, $p < 0.001$), with the neurotypical group scoring these words at an average of 4.00. These converging effects across all three negative dimensions suggest heightened emotional

TABLE 1 Linear mixed-effects models: negative affective dimensions.

	Anxiety				Anger				Depression			
Predictors	Estimates	*CI*	Statistic	*p*	Estimates	*CI*	Statistic	*p*	Estimates	*CI*	Statistic	*p*
(Intercept)	4.50	4.47–4.52	389.32	**<0.001**	3.51	3.48–3.53	306.02	**<0.001**	4.00	3.98–4.03	336.49	**<0.001**
group [Autistic]	2.00	1.96–2.03	119.82	**<0.001**	1.48	1.45–1.51	89.66	**<0.001**	1.48	1.45–1.52	88.81	**<0.001**
N	131 $_{participant\_id}$				131 $_{participant\_id}$				131 $_{participant\_id}$			
	238 $_{word}$				238 $_{word}$				238 $_{word}$			
Observations	31,178											

Bold values indicate statistically significant effects ($p < 0.001$).

TABLE 2 Linear mixed-effects models: positive affective dimensions.

	Valence				Activation				Subjective frequency			
Predictors	Estimates	*CI*	Statistic	*p*	Estimates	*CI*	Statistic	*p*	Estimates	*CI*	Statistic	*p*
(Intercept)	5.99	5.98–6.01	762.19	**<0.001**	6.49	6.47–6.51	808.71	**<0.001**	5.51	5.50–5.53	697.83	**<0.001**
group [Autistic]	−1.49	−1.52 – −1.47	−131.79	**<0.001**	−1.49	−1.51 – −1.47	−128.62	**<0.001**	−0.51	−0.53 – −0.49	−44.97	**<0.001**
N	131 $_{participant\_id}$				131 $_{participant\_id}$				131 $_{participant\_id}$			
	238 $_{word}$				238 $_{word}$				238 $_{word}$			
Observations	31,178				31,178				31,178			

Bold values indicate statistically significant effects ($p < 0.001$).

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reactivity or sensitivity to negatively valenced internal states among autistic individuals. All models accounted for random intercepts by participant and by word ($N = 131$ participants; 238 words; 31,178 observations total), ensuring that both item-level variability and interindividual differences were properly controlled.

The evaluation of positively valenced and socially frequent words revealed the opposite pattern: autistic participants gave significantly lower ratings than neurotypicals across all three dimensions.

For valence, which captures the positivity of emotional content, the estimated group effect was −1.49, 95% CI [−1.52, −1.47], $t = -131.79$, $p < 0.001$. Neurotypicals rated these words at an average of 5.99, near the upper end of the scale, while autistic participants rated them closer to 4.5, indicating a reduced affective positivity associated with these lexical items. A similar effect was observed for activation (Estimate = −1.49, 95% CI [−1.51, −1.47], $t = -128.62$, $p < 0.001$), with a neurotypical baseline of 6.49. Activation terms often include words associated with energy, movement, or arousal (e.g., *celebrate*, *rush*), and these appeared to resonate less with autistic participants. The subjective frequency dimension, reflecting how familiar or commonly encountered a word feels, also yielded a significant group difference (Estimate = −0.51, 95% CI [−0.53, −0.49], $t = -44.97$, $p < 0.001$), with a neurotypical mean of 5.51. Although the magnitude of this effect was smaller than in emotional dimensions, the statistical robustness and consistency of direction point to a reduced lexical familiarity or personal resonance with high-frequency, socially embedded terms among autistic individuals. These three models also included participant- and word-level random intercepts, and were based on the same set of 131 participants and 238 words, ensuring comparability across the dimensions.

The combined results of both model sets indicate a clear and systematic divergence in the affective appraisal of language between autistic and neurotypical individuals. Autistic participants were consistently more sensitive to words related to negative internal states (anxiety, anger, depression), as reflected in effect sizes exceeding 1.4 points and t-values well above 80 in all cases. In contrast, they rated socially positive, frequent, and arousing words as significantly less intense or personally resonant, with nearly symmetrical effect sizes in the opposite direction.

Importantly, these patterns were not only statistically robust (all $p < 0.001$), but also highly consistent across dimensions, with narrow confidence intervals and minimal variation across models. These results lend quantitative support to the hypothesis that neurotype influences not only emotional reactivity but also the semantic-emotional mapping of language. The lexical-emotional profile observed in the autistic group suggests a preference for terms that are more interoceptively salient and emotionally concrete, as opposed to those that are socially relational, abstract, or contextually variable. We treat LMM results as the primary inferential evidence; descriptive six-word panels are provided solely for illustration.

5 Discussion and conclusions

This study explored whether autistic and neurotypical individuals differ in how they categorize emotionally charged words. Our results revealed systematic divergences in the appraisal of emotional lexicon, suggesting that neurotype may influence not only the intensity of emotional word ratings, but also the semantic-emotional criteria that guide this categorization. Autistic participants consistently assigned higher scores to words associated with internal, embodied experiences—especially those related to anxiety, depression, or heightened arousal. Terms such as *inquietud* (*uneasiness*), *jarrón* (*jar*), and *ansia* (*craving*) showed significantly higher ratings in the autistic group, indicating a possible preference for words with sensorimotor or interoceptive resonance. Links to interoception and alexithymia remain interpretive in this study, as these constructs were not directly measured.

These findings support hypotheses from emotional regulation research in autism that point to heightened physiological reactivity and altered interoceptive awareness as key mechanisms underlying affective processing (Murphy et al., 2017; Kinnaird et al., 2020; Eccles et al., 2024). Importantly, many of the words with elevated ratings in the autistic group share characteristics such as bodily anchoring lexicon *ansia* (*craving*) and *insomnia* (*insomnia*), or concrete sensory referents like *ducha* (*shower*) or *electricidad* (*electricity*), which aligns with the Interoception Model (Garfinkel et al., 2015). However, we recognize that the study did not explicitly measure interoceptive sensitivity nor operationalize interoceptive content *a priori* in the word selection. Thus, the integration of the interoception framework remains interpretative, and future studies should include direct measures of interoceptive experience or use validated taxonomies of interoceptive lexicon.

By contrast, neurotypical participants tended to assign higher ratings to socially complex or culturally embedded words, such as *admiración* (*admiration*), *soledad* (*loneliness*), or *peligro* (*danger*), whose interpretation often depends on affective inference, symbolic abstraction, or social scripts. These patterns align with literature suggesting greater reliance on Theory of Mind and social cognition in neurotypical semantic-emotional processing (Oakley et al., 2016; Shaffer et al., 2023). Nevertheless, the role of Theory of Mind in our findings remains hypothetical, as it was not directly assessed. Future research could benefit from including cognitive-affective ToM tasks to better understand whether social-inferential processing modulates semantic appraisal of emotional words.

Notably, the divergence between groups was also visible in lexical aversions. Autistic participants assigned lower emotional relevance to abstract, relational, or morally coded terms such as *desesperanza* (*hopelessness*), *decepción* (*disappointment*) or *ingratitude* (*ingratitude*). These terms may require higher levels of social abstraction or presuppose specific cultural-emotional knowledge, making them less salient for individuals whose emotional meaning-making is grounded in direct experiential access rather than social consensus. Conversely, neurotypical participants showed lower engagement with object-related or context-independent words like *ducha* (*shower*), *azotea* (*rooftop*), or *electricidad* (*electricity*), which lack overt interpersonal connotations.

A small set of outlier words, such as *jarrón* (jar) or *baúl* (*trunk*), appeared as highly emotionally salient in the autistic group, despite their limited affective valence in normative lexicons. These responses suggest that idiosyncratic or context-dependent associations may play a significant role in emotional semantics, particularly among autistic individuals. While such ratings might reflect strong personal memories or sensory associations, they also raise questions about how emotional meaning is constructed individually and the limits of standard affective norms. Future research should consider incorporating qualitative follow-ups or open-ended justifications for lexical appraisals to better capture these subjective layers.

These results hold both theoretical and applied implications. The pattern observed does not suggest a challenge in emotional processing, but rather a neurotype-specific pathway for constructing emotional meaning: one anchored in interoceptive and perceptual cues (autistic individuals), and the other oriented toward socio-cognitive integration (neurotypical individuals). This supports a pluralistic model of affective language processing and provides empirical support for neurodiversity-informed approaches that recognize variability in emotional cognition as adaptive, not pathological (Williams and Gotham, 2021; Kapp et al., 2013).

The statistical modeling results further substantiate the interpretative patterns discussed above. Mixed-effects models confirmed that neurotype predicted systematic differences in the appraisal of affective and lexical dimensions. Autistic participants consistently attributed greater emotional weight to words reflecting internal states, physiological arousal, or sensorimotor grounding, particularly in negative affective domains. In contrast, neurotypical participants showed a marked preference for emotionally positive, socially nuanced, or abstractly valenced terms. These effects were not incidental but emerged robustly across multiple dimensions, suggesting that neurotype exerts a stable and generalizable influence on the emotional-semantic interpretation of words.

Crucially, these modeling outcomes reinforce the notion that emotional word processing reflects not just variation in preference or style, but fundamental differences in how affective meaning is constructed and prioritized. The divergent patterns observed across negative and positive dimensions suggest that each neurotype may engage distinct cognitive and experiential systems when interpreting language: Examples based on the six highest/lowest items are illustrative and not probative; our conclusions rest on the mixed-effects models, which directly test group differences across all words and dimensions.

Practically, these insights point to the need for more tailored communication strategies. In educational and therapeutic contexts, emotional communication with autistic individuals may benefit from the use of concrete, bodily grounded, and personally meaningful language. This does not imply simplification, but rather alignment with the individual's emotional architecture. Moreover, fostering mutual awareness of these differences can reduce miscommunication and promote more inclusive relational dynamics.

The present study is subject to several limitations. First, the exclusive use of noun-based stimuli may have constrained the range of emotional meanings under investigation; future research should incorporate verbs, adjectives, and idiomatic expressions to assess whether neurotype-specific patterns extend across lexical classes. Second, although the design included dimensions such as depression, anxiety, and anger, it did not include direct measures of alexithymia or interoception, constructs that could substantially modulate emotional categorization. Third, the cultural and linguistic homogeneity of our Chilean Spanish-speaking sample restricts the generalisability of the findings, underscoring the need for cross-cultural replications. Finally, reliance on self-report ratings within a single-session task precludes triangulation with behavioral or physiological data, which future studies could employ to provide a more comprehensive account of neurotype-specific emotional semantics.

In sum, our findings suggest that emotional word processing is neurotype-contingent, shaped by different experiential and cognitive systems. These results challenge monolithic models of emotional competence and underscore the importance of including neurodivergent perspectives in psycholinguistic and affective science. Recognizing these diverse emotional-semantic frameworks is essential not only for scientific accuracy but also for fostering more respectful and effective communication across neurotypes.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Comité ético científico Universidad de Las Américas. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

FH: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. ML-V: Conceptualization, Investigation, Supervision, Validation, Writing – original draft, Writing – review & editing. BC: Formal analysis, Funding acquisition, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing. NS-O: Investigation, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Correction note

This article has been corrected with minor changes. These changes do not impact the scientific content of the article.

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