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A New Perspective on Anhedonia in Schizophrenia

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Abstract

Objective—Previous research provides evidence for discrepancies among various types of emotional self-report in individuals with schizophrenia, such that patients report similar levels of positive emotion to controls when reporting current feelings, yet diminished levels of positive emotion when reporting on non-current feelings. These apparent discrepancies have come to be termed “the emotion paradox” in schizophrenia, and made it increasingly difficult to understand what anhedonia actually reflects in this patient population.

Method—In the current manuscript, we review the literature on emotional experience in schizophrenia through the lens of a well-validated model of emotional self-report developed in the affective science literature that clarifies the sources of emotion knowledge that individuals access when providing different types of self-report. We use this model to resolve the “emotion paradox” and provide a new psychological conceptualization of anhedonia.

Results—Data are presented in support of this new perspective on anhedonia, and to demonstrate how cognitive impairments may influence reports of non-current feelings in schizophrenia.

Conclusions—We conclude that anhedonia should no longer be considered an experiential deficit or a diminished “capacity” for pleasure in schizophrenia. Rather, anhedonia reflects a set of beliefs related to low pleasure that surface when patients are asked to report their non-current feelings. Encoding and retrieval processes may serve to maintain these beliefs despite contrary real-world pleasurable experiences. Implications for assessment and treatment are discussed in relation to this new conceptualization of anhedonia.

Keywords

Schizophrenia; Emotion; Negative Symptoms; Retrospective; Prospective

Overview

Anhedonia has long been considered a core clinical feature of schizophrenia (1–3). The most common understanding of anhedonia is that it reflects a diminished experience of pleasure. Although this definition clearly applies to individuals with major depression who report experiencing less pleasure when exposed to things that were previously enjoyable, and rate positive stimuli as being less pleasant than do controls (4–7), it is uncertain whether these notions accurately reflect anhedonia as it occurs in schizophrenia.

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Confusion regarding the nature of anhedonia in schizophrenia comes from a consistent set of contradictory findings in the empirical literature, which have come to be termed “the emotion paradox”. Specifically, patients report levels of positive emotion that are similar to controls when providing reports of current feelings, but report less pleasure than controls when reporting their non-current feelings (see 8–9 for meta-analysis and review). When results from these diverse methods are viewed together, it is unclear what anhedonia actually reflects in schizophrenia. In the current manuscript, we review the empirical literature on anhedonia and emotional experience in schizophrenia through the lens of a well-validated model of emotional self-report developed in the affective science literature (10), and use this model to resolve the “emotion paradox” and provide a new conceptualization of anhedonia.

Reports of Current Feelings in Schizophrenia

Self-reports of emotional experience can be divided into two broad categories: reports of current feelings and reports of non-current feelings (10). The key difference between the two lies in the timeframe and response format of the query that is used. Reports of current feelings ask participants to report how they feel in the moment. They can be made in response to stimuli, during daily events, or in an interview- the determining factor is whether the question asks how the person feels “right now” or “at this moment”.

In the schizophrenia literature, studies asking subjects to report current feelings of positive emotion consistently indicate that patients provide in-the-moment reports that are similar to controls. For example, findings from laboratory-based experiments indicate that individuals with schizophrenia report experiencing levels of positive emotion that are similar to controls when exposed to a variety of evocative stimuli, including complex pictures, faces, sounds, words, and food (8–9, 11–16). Results of naturalistic experience sampling studies provide a similar picture, indicating that although patients have a reduced frequency of positive events in their daily lives (17–18), they report experiencing increases in positive emotion that are comparable to controls when engaged in pleasurable events (19–20).

However, there is consistent evidence indicating that individuals with schizophrenia have a heightened experience of negative emotions when reporting current feelings. This was highlighted by a recent meta-analysis of laboratory-based emotional experience studies by Cohen and Minor (8), which found that patients report experiencing greater negative emotion than controls when exposed to unpleasant, neutral, and pleasant stimuli and asked to rate how negative those stimuli made them feel. Naturalistic studies obtaining reports of current feelings also indicate that patients report higher levels of negative emotion during their daily lives (17–18). Due to the uniformity of these findings, it has been suggested by some that anhedonia may in part reflect elevations in negative emotion (13, 21–22). Consistent with this notion is a recent study that employed a data-driven approach to determining whether sub-groups of patients could be identified based upon their self-reported current feelings when exposed to pleasant and unpleasant stimuli (22). Cluster and discriminant function analyses revealed that the majority of people with schizophrenia reported experiencing positive and negative emotional stimuli similarly to controls. However there was a sub-group of patients who reported experiencing unpleasant stimuli as being highly negative and arousing, and these patients had elevated anhedonia ratings on the Chapman Physical and Social Anhedonia Scales (23). Thus, it is possible that anhedonia, at least in part, reflects abnormalities in the momentary experience of negative, but not positive emotions in schizophrenia.

Reports of Non-Current Feelings in Schizophrenia

It is also very common to ask patients to provide reports of non-current feelings. Reports of non-current feelings are made using several different response formats, including

retrospective, trait, hypothetical, and prospective self-reports. In contrast to reports of current feelings, there is substantial evidence that patients report experiencing less pleasure than controls when self-reports require reporting their non-current feelings (24). Below we review the literature on reports of non-current feelings in schizophrenia in relation to the various self-report formats.

Retrospective Self-Reports

“Retrospective” emotional self-reports are those that require subjects to report on feelings from the past. Standard clinical interviews that require patients to report past pleasurable feelings are an example of “retrospective” emotional self-reports. Examples of queries used to elicit a retrospective emotional self-report include “Over the past 2 weeks, how good did you feel?”, “what did you do for fun in the past few weeks- how good did you feel when you did that?” It is generally accepted that a large percentage of individuals with schizophrenia report diminished pleasure when queried during clinical interviews that elicit retrospective reports (9, 25). For example, in our outpatient clinic at the Maryland Psychiatric Research Center (MPRC), approximately 82% of schizophrenia patients meet criteria for at least mild severity of anhedonia and 58% for moderate or higher using the Scale for the Assessment of Negative Symptoms (SANS, 26) (n = 385). Thus, patients report less pleasure when reporting on feelings from the past.

Hypothetical Self-Reports

Individuals with schizophrenia also report less pleasure than controls on a number of self-report questionnaires that fall into the category of “hypothetical” emotional self-reports (24). “Hypothetical” emotional self-reports, like the Chapman Physical and Social Anhedonia Scales (23), ask subjects to indicate how they think they would feel in a certain hypothetical scenario (e.g., True or False: “Although there are things that I enjoy doing by myself, I usually seem to have more fun when I do things with other people”). Patients consistently endorse experiencing less pleasure than controls when completing hypothetical emotional self-reports (24).

Trait Self-Reports

“Trait” emotional self-reports ask participants to indicate how much they *generally* feel a specific emotion (e.g., In general, how *happy* do you feel? 1 = not at all to 5 = extremely). When completing trait measures, patients typically report less positive emotion and more negative emotion than controls (24).

Prospective Self-Reports

Prospective emotion reports require participants to predict their emotions in the future. Several studies indicate that individuals with schizophrenia predict less pleasure than controls when providing prospective self-reports of pleasure, which has lead some to suggest that anhedonia primarily reflects an “anticipatory” pleasure deficit. Gard et al. (19) conducted a naturalistic study, which required participants to indicate what they were doing and how much pleasure they felt at that moment, as well as which activities they were looking forward to doing and how much pleasure they expected to experience while doing them. They found that patients differed from controls in the amount of enjoyment they anticipated they would get out of future goal-directed activities, but reported similar levels of in-the-moment pleasure as controls. Several additional studies have used a new self-report questionnaire, the Temporal Experience of Pleasure Scale (TEPS, 27), to assess consummatory (i.e., momentary) and “anticipatory” (i.e., future) pleasure, and found that patients report intact consummatory but diminished anticipatory pleasure (19, 28; however, see 29).

Summary

When results obtained using retrospective, prospective, hypothetical, and trait self-report formats are viewed together, it is clear that individuals with schizophrenia report less pleasure than controls when reporting their non-current feelings. The fact that diminished reports of pleasure encompass all self-reports that entail reporting on non-current feelings, and not just prospective reports, indicates that anhedonia cannot solely reflect an anticipatory pleasure deficit. The apparent discrepancies between reports of current pleasure, which indicate that patients are similar to controls, and reports of non-current pleasure, where patients report less pleasure than controls, have been the focus of much discussion over recent years. Some researchers have termed the lack of correspondence between these two types of reports the “emotion paradox” in schizophrenia. But, is this really a paradox? Should we expect reports made using these different response formats to converge? If not, what do self-reports obtained using these different measures tell us about what self-reported anhedonia actually reflects in schizophrenia?

Is there an Emotion “Paradox” in Schizophrenia?

In clinical practice, it is often assumed that the same processes are involved in all types of emotional self-report; however, this assumption is a mistake. There is consistent empirical evidence for discrepancies among different types of emotional self-report indicating that healthy individuals frequently report differences in what they are currently experiencing compared to what they have experienced in the past or expect to experience in the future (10, 30–31). These discrepancies result from accessing different types of knowledge when providing the various types of emotional self-report. Each source of information can result in a different pattern of self-reported emotional experience depending upon what is required by the method of measurement, and inconsistencies among the different methods of assessment would thus be expected.

A model of emotional self-report developed in the affective science literature by Robinson and Clore (10) called the “Accessibility Model of Emotional Self-Report” clarifies why such discrepancies are likely to occur and delineates the sources of knowledge that people access when providing reports of current and non-current feelings. Their model proposes that people access four sources of information when reporting their feelings: 1) experiential knowledge, 2) episodic memory, 3) situation-specific beliefs, and 4) identity-related beliefs. Individuals are thought to prioritize these sources of information, relying first on the most specific and accessible source of information that is relevant to the query presented. In this sense, when a given query renders one type of knowledge inaccessible, people respond by accessing the next most specific source of information that is available (See Figure 1).

In brief, Robinson and Clore (10) propose that when reporting on current feelings, individuals access experiential knowledge and report directly on their emotions in a way that is uninfluenced by episodic memory abilities or overarching attitudes and beliefs. However, when required to provide self-report of non-current feelings, individuals attempt to utilize episodic memory to retrieve relevant contextual details that can enable them to recreate their previous emotional experiences (see Table 1). To the extent to which enough contextual details can be retrieved to generate an emotional experience similar to the one at the time of the initial episode, individuals are able to use episodic memory to report their recent emotions, and these reports are consistent with their previous experiences. However, when episodic memories are inaccessible, or irrelevant to the response format at hand, people will rely on broader sources of information that are available to them, namely situation-specific or identity-related beliefs. These most general sources of knowledge include beliefs about which types of emotions are likely to be elicited by specific situations (e.g., “Social

interactions are enjoyable”), as well as general attitudes and beliefs that the person holds about him or herself (“I am generally a happy person”), respectively.

Consistent with this model, there is evidence indicating that reports of current and non-current feelings of positive emotion made by healthy individuals diverge in meaningful and expected ways. For example, when healthy individuals are asked to rate their prospective pleasure before a vacation, in-the-moment pleasure during a vacation, and retrospective pleasure after a vacation, they typically overestimate their level of pleasure prospectively and retrospectively relative to what they experienced in the moment (32). Robinson and Clore (10) propose that this bias toward overestimating positive emotions during reports of non-current feelings occurs because healthy individuals draw upon semantic knowledge stores and rely on situation-specific or identity-related beliefs when making these reports. Elevated reports of non-current relative to current feelings therefore reflect that most healthy individuals believe that they are generally in a moderately positive mood and that specific types of situations (e.g., vacations) are pleasurable.

Much like healthy individuals, individuals with schizophrenia also show discrepancies among reports of current and non-current feelings (as previously reviewed). Below we report a secondary analysis of data from Heerey and Gold (33) and Strauss et al. (29) to examine whether schizophrenia patients and controls display the same patterns of relationships between reports of current and non-current feelings. Characterizing data are presented for patient and control groups in the footnotes of each Table where data are presented.

To test the hypothesis that patients and controls display similar patterns of emotional self-report, we first examined whether various reports of non-current feelings were more highly correlated with each other than with reports of current feelings. Measures of current feelings consisted of self-reported feelings of positive and negative emotion to pleasant, unpleasant, and neutral stimuli from the International Affective Picture System (IAPS; 34) (see 33). Reports of non-current feelings were examined from all of the major emotional self-report response formats, including trait (Positive and Negative Affect Scale, 35), hypothetical (Chapman Physical and Social Anhedonia Scales, 23; Temporal Experience of Pleasure Scale, TEPS 27), retrospective (Scale for the Assessment of Negative Symptoms, SANS, 26), and prospective (TEPS-Anticipatory Pleasure Subscale, 27) measures. As can be seen in Table 2, for both controls and patients, in-the-moment valence reports (i.e., reports of current feelings) were not significantly correlated with trait positive and negative affect on the Positive and Negative Affect Scale or the Chapman Scale Physical or Social Anhedonia scales (i.e., reports of non-current feelings). Additionally, there was no significant association between valence reports and Anhedonia on the Scale for the Assessment of Negative Symptoms in patients. Table 3 presents correlations among various self-reports of non-current feelings in controls and patients, and indicates that both groups generally show moderate relationships among the trait, hypothetical, and prospective reports. Importantly, in both groups, the magnitude of correlations among the various non-current feeling reports is higher than the magnitude of correlation between current and non-current feeling reports.

A number of studies on healthy individuals indicate that reports of current and non-current feelings are often moderately correlated with each other (e.g., 36–37, see 10 for review), but that various measures of non-current feelings tend to correlate with each other more highly than they do with measures of current feelings. This pattern of correlations may reflect shared method variance to some extent, but it is also consistent with Robinson and Clore’s notion that current and non-current emotion reports are completed by accessing different sources of emotion knowledge. Relatively few studies have reported correlations among a wide number of emotional self-reports in schizophrenia; however, there is consistent

evidence that patients display a pattern of correlations among reports of current and non-current feelings that is similar to controls (13, 15, 38, 39). Although additional studies are needed to make a definitive determination, these findings suggest that there is in fact no “emotion paradox” in schizophrenia—at least, not in the sense that different types of emotional self-report lead to inconsistent results in patients but not controls. However, this should not be surprising and should even be expected because it is known that individuals complete reports of current and non-current feelings by accessing different sources of emotion knowledge (10). What is surprising, however, is that patients show a different pattern of self-report across measures of current and non-current feelings compared to controls. Whereas controls report *higher* levels of non-current than current positive emotions, individuals with schizophrenia do not. This pattern of self-report may reflect that patients *underestimate* their positive emotions prospectively and retrospectively or that they have a reduced or absent *overestimation* bias. We are unaware of experience sampling studies requiring patients and controls to provide prospective, current, and retrospective self-reports using the same reporting format; however, such a study would clarify which interpretation is correct.

What do Diminished Reports of Non-Current Positive Emotion Reflect in Schizophrenia?

When viewed in relation to Robinson and Clore’s model (10), the apparent discrepancies among different types of self-report are clearly interpretable. When asked to make reports of current positive emotion, patients like controls, will access experiential knowledge and report directly on their feelings. In this sense, reports of current feelings are the only true indication of someone’s “capacity” for pleasure when exposed to a pleasurable event/stimulus because they rely only on experiential emotion knowledge. The fact that patients report experiencing similar levels of pleasure as controls when providing reports of current feelings suggests that the long-held notion that people with schizophrenia have a reduced “capacity” for pleasure (3) should no longer be viewed as an accurate conceptualization of anhedonia as it occurs in this patient population (see also 8–9, 13, 15, 33).

The abnormal reports of positive emotion that have been taken as indication of anhedonia occur when patients are asked to report their non-current feelings using retrospective, prospective, hypothetical, and trait formats. What these self-reports have in common is that they require access to semantic rather than experiential emotion knowledge, and are thus completed by accessing beliefs about pleasure. For example, hypothetical reports like the Chapman Scales are by their nature completed by accessing semantic memory and people respond to individual items by drawing upon situation-specific or identity-related beliefs. Similarly, the “in-general” timeframe in trait reports makes it difficult to average across life events, and trait measures are completed by accessing beliefs about pleasure. Lower reports of positive emotion found using the various reports of non-current feelings can thus be interpreted as reflecting that patients do not display the same retrospective/prospective overestimation bias as controls, and that they either do not possess normative beliefs regarding whether specific situations result in pleasure, or that they do not hold the same broad identity-related beliefs as controls. Future studies should investigate whether the abnormal self-reports of non-current positive emotion seen in schizophrenia reflect situation-specific, identity-related, or both types of beliefs.

It is of considerable clinical importance to understand the meaning of retrospective reports of pleasure that are obtained during a symptom interview. When providing retrospective reports, individuals attempt to retrieve contextual details of episodes that occurred in the time period that is queried (e.g., past 2 weeks, past month), and reconstruct their past feelings by recalling relevant event-related details and past thoughts (10, 30–31). The ability

to recall these contextual details fades quickly over time (40), and when there are too few episodic details to facilitate reports about past emotions, individuals access semantic memory and rely on more general beliefs about their emotions to fill in the details of what they cannot remember (31). In such cases, retrospective reports may be inconsistent with the actual emotions experienced during the period in question. The wider the time-frame used in the query, the more likely it is that a subject will rely on semantic, rather than episodic memory to complete the emotion report. In healthy individuals, there is evidence that episodic memory can typically be accessed to complete emotion reports for timeframes narrower than “the last few weeks”, and that semantic memory is accessed for timeframes broader than this (31). These findings are important for understanding the meaning of retrospective emotion reports in schizophrenia and what appear to be contradictory findings in the empirical literature. On the one hand is experimental data from studies showing that patients do not differ from controls on retrospective pleasure reports when relatively short timeframes are used (e.g., 4 hours) (13, 38), and on the other is clinical interview data collected using wider timeframes (e.g., past 2 weeks) where patients retrospectively report diminished pleasure (25). A likely explanation for these discrepancies is that when patients are asked to provide retrospective reports over shorter timeframes (e.g., 4 hrs), they can rely on episodic memory and accurately recall their initial experience of positive emotion. However, when providing retrospective reports over longer timeframes, patients (much like controls) are likely to rely on semantic memory because they cannot recall enough contextual details of episodes occurring during these wide timeframes. Abnormal retrospective reports made to longer timeframes, therefore likely reflect that patients base their report upon their general sense of well-being, rather than the actual emotions that were experienced during the timeframe in question. The severity of a patient’s episodic memory impairments should dictate the point at which they no longer base their report of episodic memory and shift to relying on semantic memory. One should take this into account when conducting symptom interviews, and know that the timeframe selected for the retrospective report is of critical importance because it dictates whether the self-report reflects memory for recent feelings, as intended, or rather beliefs about how the patient thinks they generally feel which may be inaccurate.

Additionally, newer next-generation negative symptom scales also include prospective emotion reports to assess anhedonia (41–42). Prospective reports are less influenced by episodic memory than other types of emotion report (e.g., retrospective), and more influenced by beliefs about emotion (10). Studies utilizing prospective self-reports that have found patients to report less predicted future pleasure than controls (19) provide converging evidence with studies utilizing retrospective, hypothetical, and trait self-report formats, and indicate that patients have abnormal beliefs related to pleasure and lack the overestimation bias seen in controls. Overestimating future pleasure occurs for a number of reasons, including: accessing unrepresentative memories to gauge how good one will feel in the future; focusing on essential features of future events, particularly far-off events, and ignoring inessential features that may be less pleasant and lower the overall net value of the event; focusing on early moments of a future event and ignoring that later feelings are likely to be less intense; and ignoring the fact that contextual factors present or not present at the moment may be more or less important in the future (43). Any number of these factors may function differently in schizophrenia, and make prospective overestimation less likely.

It will be important to determine how patients develop these beliefs of low pleasure. We speculate that such beliefs may stem from not having an adequate number and diversity of pleasurable experiences to develop normative beliefs of pleasure, as well as early negative life events (e.g., social rejection) that shaped their identity-related and situation-specific beliefs about pleasure.

The Role of Cognitive Impairments in Emotional Self-Report in Schizophrenia

It is clear that there are different cognitive demands associated with various emotional self-reports, and these demands may affect patients differently than controls depending upon the nature and severity of their cognitive impairments. In addition to the influence of episodic memory deficits on retrospective reports previously discussed, hypothetical reports are also likely influenced by cognitive impairments. Hypothetical reports like the Chapman scales require individuals to form a mental representation of the situation being probed (44)-a process that requires working memory. It is likely that the severity of a patient's working memory impairment would interact with their ability to complete hypothetical reports, potentially causing them to rely on broad identity-related beliefs when they have difficulty forming a mental representation of the hypothetical scenario. Thus, the presence of cognitive impairments may influence patients' reports of non-current feelings in a predictable way, causing them to access semantic memory and base their self-report on broad identity-related beliefs instead of the intended sources of emotion knowledge (i.e., episodic memory for retrospective reports and situation-specific beliefs for hypothetical reports).

To test the possibility that cognitive processes are related to reports of non-current, but not current reports of emotion in schizophrenia, we conducted a secondary analysis of data from Heerey and Gold and Strauss et al. (29, 33) We hypothesized that: 1) retrospective reports of pleasure on the Scale for the Assessment of Negative Symptoms anhedonia item would be related to poorer episodic memory on a standard neuropsychological memory measure, and 2) reports of pleasure on hypothetical scales like the Chapman Scales and Temporal Experience of Pleasure Scale would be related to working memory impairments. As can be seen in Table 2, reports of current feelings in response to positive stimuli were not significantly correlated with either working memory or episodic memory. This nonsignificant correlation is consistent with Robinson and Clore's (10) notion that cognitive processes do not affect reports of current feelings. As hypothesized, retrospective reports of pleasure on the Scale for the Assessment of Negative Symptoms were associated with poorer episodic memory (Table 3), and patients rated as having mild to severe clinically rated anhedonia had poorer memory than patients with questionable or no anhedonia (see Figure 2). Also as predicted, poorer working memory was significantly correlated with reports of lower pleasure on hypothetical reports, as indicated by significant associations between working memory performance and anhedonia on the Chapman Scales and lower pleasure on the Temporal Experience of Pleasure Scale Consummatory subscale (see Table 3). Notably, the correlation between working memory and the Temporal Experience of Pleasure Scale Anticipatory subscale was nonsignificant; however, this may reflect the lack of an anticipatory pleasure deficit in our patient sample (29). Overall, findings provide some preliminary support for the notion that cognitive impairment is related to reports of non-current feelings in schizophrenia. Other studies have also demonstrated the role of cognitive and neurophysiological impairments in emotional self-report. For example, Ursu and colleagues (45) found that patients displayed similar neural activation to controls in the presence of emotional stimuli at prefrontal, limbic, and paralimbic structures, but reduced activation in the dorsolateral prefrontal cortex during a 12.5 second delay period that occurred before subjects made a retrospective emotion report, when cognitive control processes were actively engaged in maintaining emotional experience. Burbridge and Barch (46) found that working memory moderates the relationship between hypothetical reports and in-the-moment pleasure reports, which is consistent with the notion that working memory deficits may predict the extent to which patients complete non-current feeling reports by relying on semantic vs. episodic emotion knowledge.

An important question also remains as to how patients maintain beliefs of low pleasure despite having some life experiences where they do engage in pleasure-seeking behavior and experience high levels of positive emotion while doing so—why do these experiences not serve as counter-evidence to alter these beliefs? One possibility is that cognitive processes facilitate the maintenance of these beliefs. In the literature on personality and autobiographical memory in healthy individuals, there is evidence that broad identity-related beliefs are sometimes dissociated from daily life events (47). This research demonstrates that individuals form emotional schemas (e.g., “How I generally feel during family interactions”), and that these schemas are used to organize and reconstruct details from life events, especially those occurring further in the past. When a life event does not match the schema that an individual holds, it is often forgotten or not retrieved (47–48). These schemas thus play a major role in forming and maintaining identity-related beliefs, even in the face of contradictory evidence. Once such beliefs are formed, they are often slow to change in response to actual experiences because individuals encode and retrieve information consistent with their beliefs, instead of information that contradicts them, to maintain a consistent self-representation (48). It is possible that schizophrenia patients maintain the belief that they do not experience pleasure despite counter evidence from real-world experiences because every-day experiences of pleasure are inconsistent with their long held beliefs, and thus not encoded or retrieved. Studies on emotional memory in schizophrenia are consistent with this notion, providing evidence for aberrant encoding and retrieval of positive stimuli (49).

Behavioral Component of Anhedonia

In addition to the psychological component that is evident when patients report on non-current feelings, it is also clear that there is a behavioral aspect of anhedonia. Several studies indicate that schizophrenia patients engage in fewer pleasurable activities than healthy controls (17–20), which may occur because they are less motivated to initiate goal-directed activities that could yield pleasurable opportunities. Psychological processes likely contribute to this behavioral component of anhedonia. Simply put, if patients believe that they generally do not experience pleasure or that specific activities (e.g., social interactions) do not bring pleasure, then why engage in them? From a clinical standpoint, it is therefore likely that the presence of such beliefs would be useful in predicting which patients would or would not evidence reduced pleasure seeking behavior.

Treatment Implications

It is feasible that these beliefs could be changed by targeting cognitive distortions that people with schizophrenia hold about their emotions. Grant et al. (50) recently developed such a treatment approach that asks schizophrenia patients to monitor their activities and emotional experiences regularly to collect “data” that can then be reviewed in treatment sessions to disconfirm the belief that nothing is enjoyable. When these cognitive therapy techniques are coupled with behavioral ones that actively schedule pleasurable events in the patient’s life, these methods may be a valuable means of providing the type of feedback that can shift beliefs of low pleasure. The behavioral treatment component seems particularly important given that many patients have limited resources and fewer opportunities for pleasure, and thus may not have enough pleasurable activities to counter the belief that they do not experience pleasure without pleasurable events actively scheduled into their lives. Given that anhedonia reflects psychological and behavioral processes, rather than experiential ones, it may be that treatment strategies would be more effective if focused on changing low pleasure beliefs and increasing pleasure-seeking behavior, rather than increasing capacity for positive emotional experience.

Summary

In the current review, we used the Accessibility Model of Emotional Self-report to reconsider the nature of anhedonia in schizophrenia. Based upon this review, we propose that anhedonia should no longer be viewed as a diminished *capacity* to experience pleasure in people with schizophrenia. Rather, anhedonia appears to have three components: 1) a psychological component that consists of a set of beliefs related to low pleasure that surfaces when asked to report on non-current positive emotions, 2) a behavioral component reflected by reductions in pleasure-seeking behavior, and 3) elevations in negative emotion (see Figure 3). Given that schizophrenia is not characterized by an experiential hedonic deficit, it may be that the term “anhedonia” is no longer appropriate—more descriptive terms like “reduced pleasure-seeking behavior” and “beliefs of low pleasure” are more accurate and perhaps more likely to promote advances in assessment and treatment.

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Figure 1.

Diagram of the four sources of information accessible when providing emotional self-report according to Robinson & Clore's Model.

The Accessibility Model proposes that individuals access 4 sources of information when providing emotional self-report. Experiential and episodic information rely on episodic emotion knowledge, whereas situation-specific and identity-related beliefs rely on semantic emotion knowledge. Individuals prioritize the most specific source of knowledge that is available to them and relevant to the response format being used. The middle column illustrates the hierarchy of information prioritization. The right column depicts the most common types of emotional self-report that are likely to be based upon the different sources of information.

Figure 2.
Mean HVLT/BVMT MATRICS T-Scores in Patients with High and Low SANS Anhedonia Ratings.

Behavioral and characterizing data originally published in Strauss et al. (29). Participants included 86 individuals with DSM-IV diagnoses of schizophrenia or schizoaffective disorder and 59 healthy controls recruited from the community. Groups did not differ on age, parental education, gender, or race. Individuals with schizophrenia were divided into high (HI-ANH) and low (LOW-ANH) anhedonia groups according to average scores across all anhedonia items on the Scale for the Assessment of Negative Symptoms. HI-ANH patients had mean ratings of 2 or greater (mild severity or higher). Low-ANH patients had mean ratings less than 2 (questionable or absent). Groups were compared on the mean MATRICS battery t-score of BVMT/HVLT items (mean = 50; standard deviation = 10). HI-ANH and LOW-ANH significantly differed in mean memory performance, $F(1, 85) = 6.02$, $p = 0.01$, such that HI-ANH had poorer memory performance than LOW-ANH patients.

Figure 3.

Diagram of the new psychological perspective on anhedonia

We propose that anhedonia has three components: 1) low pleasure beliefs and the lack of prospective/retrospective overestimation of positive emotion, 2) reduced pleasure-seeking behavior, and 3) elevated negative emotions. These three components may interact with one another. Low pleasure beliefs consist of situation-specific and/or identity-related beliefs. Encoding and retrieval processes maintain low pleasure beliefs.

Table 1

Definitions of Episodic and Semantic Memory

Episodic Memory	Memory for a specific event or experience in the past that is highly susceptible to forgetting after sufficient passage of time.
Semantic Memory	General knowledge (e.g., meanings of words, over-learned facts) that is independent of any specific learning episode or experience and is typically resistant to forgetting over time. Such general knowledge forms the basis for new generalizations and beliefs that are seldom updated and do not fade easily over time.

Table 2

Correlations between Online Valence Self-Report and Measures of Cognition, Hypothetical Report, Retrospective Report, and Trait Report.

	Type of Measure	Online Valence Positive Stimuli	Online Valence Neutral Stimuli	Online Valence Negative Stimuli
Schizophrenia				
HVLT Total	Memory	0.03	-0.08	0.07
LNS Total	Working Memory	-0.14	-0.31	-0.24
PANAS PA	Trait	0.04	0.07	-0.17
PANAS NA	Trait	0.11	-0.08	0.02
Chapman PA	Hypothetical	-0.16	-0.03	0.10
Chapman SA	Hypothetical	-0.13	0.08	-0.01
SANS ANH	Retrospective	0.03	0.03	-0.02
Control				
HVLT Total	Memory	-0.15	0.27	0.20
LNS Total	Working Memory	-0.21	-0.10	-0.06
PANAS PA	Trait	0.14	0.12	0.04
PANAS NA	Trait	0.18	-0.09	0.21
Chapman PA	Hypothetical	-0.03	-0.19	-0.13
Chapman SA	Hypothetical	-0.06	-0.14	-0.04
SANS ANH	Retrospective	--	--	--

Note. Behavioral and characterizing data originally published in Heery and Gold (33). Participants included 41 outpatients with DSM-IV diagnoses of schizophrenia or schizoaffective disorder and 31 healthy controls recruited from the community. Groups did not differ on age, parental education, gender, or race. Participants rated how positive or negative they felt while viewing positive, negative, and neutral stimuli from the IAPS stimulus set on the standard 9-point likert scale. Behavioral analyses indicated that groups did not significantly differ in self-reported valence ratings for positive, negative, or neutral images. HVLT Total = Hopkins Verbal Learning Test trials 1–3 total; LNS Total = Letter-Number Sequencing Test T-Score; PANAS PA = Positive and Negative Affect Scale Positive Items Total; PANAS NA = Positive and Negative Affect Scale Negative Items Total; Chapman PA = Chapman Scale Physical Anhedonia; Chapman SA = Chapman Scale Social Anhedonia; SANS ANH = Average of all Anhedonia Items on the Scale for the Assessment of Negative Symptoms.

Table 3
Correlations among Hypothetical, Retrospective, Trait, Prospective Emotion Reports and Cognition.

Type of Measure	Chapman PA	Chapman SA	TEPS ANT	TEPS CON	SANS ANH	PANAS PA	PANAS NA	LNS	HVLT/BVMT
Schizophrenia									
Chapman PA	1.00								
Chapman SA	0.66***	1.00							
TEPS-ANT	-0.23*	-0.25*	1.00						
TEPS-CON	-0.40**	-0.13	0.54***	1.00					
SANS ANH	0.33**	0.51***	0.04	-0.07	1.00				
PANAS PA	-0.36**	-0.36**	0.32*	0.27*	-0.29*	1.00			
PANAS NA	0.19*	0.34**	-0.32*	-0.12	0.30*	0.03	1.00		
LNS	-0.43***	-0.32**	0.16	0.27*	-0.24*	0.08	-0.07	1.00	
HVLT/BVMT	-0.28**	-0.23*	-0.02	0.03	-0.22*	0.07	-0.24*	0.54***	1.00
Control									
Chapman PA	1.00								
Chapman SA	0.54***	1.00							
TEPS-ANT	-0.30*	-0.07	1.00						
TEPS-CON	-0.65***	-0.28*	0.41***	1.00					
SANS ANH	--	--	--	--	1.00				
PANAS PA	-0.19	-0.22	0.06	0.28	--	1.00			
PANAS NA	0.16	0.28	-0.27	-0.32*	--	--	1.00		
LNS	0.04	-0.01	0.04	0.14	--	-0.13	0.12	1.00	
HVLT/BVMT	-0.02	0.04	-0.06	0.21	--	-0.14	0.11	0.47**	1.00

Note. Behavioral and characterizing data originally published in Strauss et al. (29). Participants included 86 individuals with DSM-IV diagnoses of schizophrenia or schizoaffective disorder and 59 healthy controls recruited from the community. Groups did not differ on age, parental education, gender, or race. Participants completed self-report emotion questionnaires. Individuals with schizophrenia had significantly lower scores on the HVLT/BVMT, LNS, TEPS-CON (less pleasure), and PANAS PA (less positive emotion) than controls, and significantly higher scores on the Chapman PA and SA (more anhedonia), and PANAS NA (more negative emotion). Groups did not differ on the TEPS-ANT, HVLT/BVMT = Mean MATRICS Battery T-score on the Hopkins Verbal Learning Test trials 1–3 total and Brief Visual Memory Test Trials 1–3 subscales; LNS Total = Letter-Number Sequencing Test T-Score; PANAS PA = Positive and Negative Affect Scale Positive Items Total; PANAS NA = Positive and Negative Affect Scale Negative Items Total; Chapman PA = Chapman Scale Physical Anhedonia; Chapman SA = Chapman Scale Social Anhedonia; SANS ANH = Average of all Anhedonia Items on the Scale for the Assessment of Negative Symptoms; TEPS-ANT = Mean score on the Temporal Experience of Pleasure Anticipatory Subscale; TEPS-CON = Mean score on the Temporal Experience of Pleasure Consummatory Subscale