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Research Paper

The role of Self-Talk and Inner Voices in Disordered Eating and Loneliness

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ABSTRACT

The lockdown implemented during the covid-19 pandemic has created an environment wherein many are relying on self-talk and inner voices to compensate for the lack of face-to-face communication and increased loneliness. This research investigates how disordered eating is associated with; different factors of self-talk, self-talk frequency, nature of inner voices, and loneliness. To the knowledge of the author, this is the first study analyzing the relationship between disordered eating and factors of self-talk. 105 participants completed the Eating Disorder Examination-Questionnaire, Self-Talk Scale, Revised version of the Beliefs about Voices questionnaire, and 3-Item Loneliness Scale. The results indicated that those who have high levels of disordered eating symptoms, also have higher self-talk frequency, and experience higher levels of self-talk factors (social assessment, self-criticism, self-reinforcement, and self-management), than those with low severity of the same. Furthermore, analyses indicated that people who experience more intense problems with food intake also experience higher levels of malevolent and omnipotent; inner voices, and loneliness as compared to those who present less intense disordered eating symptoms. Linear regression analyses revealed, inner voice malevolence, inner voice omnipotence, and self-talk frequency predicted disordered eating. Similarly, multiple regression analyses found that all self-talk factors, and inner voice malevolence and omnipotence predicted the same. Moreover, mediation analyses revealed, self- talk frequency predicts disordered eating when inner voice malevolence and omnipotence are mediators. This research study's results can be used among many to formulate and adapt therapeutic approaches which target voice-hearing experiences, for treating disordered eating symptomology.

Keywords: *Disordered Eating, Self-Talk, Inner Voices, Loneliness*

The Covid-19 virus has created an environment that is likely to increase disordered eating (Spigel et al., 2021). Up-to-date research conducted recently by Nutley and colleagues (2021) confirmed that some people experience worsening of their disordered eating symptoms during the pandemic. Since disordered eating is typically malignant, and even, in some situations, fatal (Westmoreland et al., 2016), it is very important

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to study it now, as increased rates of it are one of several direct outcomes of the pandemic (Rodgers et al., 2020).

It can be hypothesized that people are engaging in higher levels of intrapersonal communication since the start of the pandemic, as an attempt to compensate for the sudden lack of face-to-face socialization caused by the imposed lockdowns and quarantine (Reichl et al., 2013). Intrapersonal communication, which refers to a conversation one has with themself (Van Raalte et al., 2019), can happen in the form of self-talk, when one engages in inner dialogue, or may be experienced as inner voices (Oleś et al., 2020). McCombie and colleagues (2020) suggested that, in light of the lowered distractions and in-person help, one's critical inner voice might be heightened; and in turn maintain and propagate symptoms of disordered eating.

Other than disordered eating, self-talk is linked with one's loneliness (Ford, 2015). Many have reported that they felt lonelier during the pandemic (Dahlberg, 2021). This is possibly a result of the social isolation caused by quarantine (Killgore et al., 2020). Similar to self-talk, the feeling of loneliness has been found to be linked with disordered eating (Levine, 2012).

Therefore, this research aims to study and elaborate on specific associations between disordered eating symptom severity, self-talk factors, self-talk frequency, inner voice nature and degree of loneliness.

Disordered Eating versus Eating Disorders: Definition, Clinical Representation, Diagnosis

Disordered Eating

Disordered eating describes irregular eating behaviors, alongside severe disturbance in one's emotional and thought processes (Anderson, 2018; Aparicio-Martinez et al., 2019). While such behaviors exist on a spectrum varying from restrictive dieting (Eisenberg et al., 2016) to binge eating (Ambwani et al., 2019), there are some defining factors including preoccupation with one's body, controlling one's eating, and shape and weight concerns (Lewis-Smith et al., 2021). Preoccupation with one's weight and body shape predicts disordered eating (Aparicio-Martinez et al., 2019; Samuels et al., 2019) in both males (Chapman & Woodman, 2016) and females (Sharpe et al., 2018). This is backed by Mitchison and colleagues' (2017) study which showed that it is associated with objective binge eating as well as dietary restraint among both sexes. Both, disordered eating symptom severity and preoccupation with one's appearance significantly impact one's quality of life and are linked with psychological distress (Mitchison et al., 2017).

Other than preoccupation, those with disordered eating also present unhealthy behaviors related to controlling their diet, and other factors which potentially impact their body's physical features. For example, Froreich and colleagues' (2017) study stated that up to 50% of those with disordered eating practiced behaviors such as smoking extra cigarettes, skipping meals, eating small amounts of food at a quick pace, replacing meals with supplements and medication, and ingesting laxatives with an intention to maintain or achieve thinness (Leal et al., 2020). Leal and colleagues' (2020) study found that not only can unhealthy weight control behaviors predispose one to develop disordered eating, but are also increasingly presented by those who suffer from the same. Based on the above, it can be assumed that diet-controlling behaviors and disordered eating share a bidirectional relationship.

While restrictive eating is a common presentation of controlling one's diet, problems with control do not always manifest themselves in accordance with a drive to skinniness. Some of those who suffer from disordered eating, eat without a sense of control, despite awareness of the negative effects of the same (Waltmann et al., 2021). There are neurobiological constructs underlying such behavior, as indicated by Balodis and colleagues' (2013) study that found diminished activity levels in brain regions that govern impulse control.

Shape and weight concerns, the umbrella term for body image disturbances, is one of the diagnostic criteria for eating disorders (APA, 2013). Such concerns are associated with one's self-perception (Gagne et al., 2012) and are characterized by a desire to alter one's body's prominent features, distress over one's weight and shape, and extreme body examination (Sicilia et al., 2020). While weight concern is one of the strongest predictors of eating disorders (Slane et al., 2014), shape concern is associated with "planning for food, snacking, and meal skipping" (Kheirollahpour et al., 2020, pp. 2011-2013). Loth and colleagues' (2014) study which found that males and females who were highly concerned about their weight during adolescence started dieting during young adulthood and presented disordered eating symptoms, supported and reinforced the bidirectionality hypothesis. A longitudinal study by Fitzsimmons-Craft and colleagues (2019) found such concerns to be associated with anxiety and depressed mood.

Eating Disorders

While eating disorders do not have a pathophysiological definition (Santonicola et al., 2019), generally, they refer to long-lasting disturbances in eating behaviors characterized by altered intake and absorption of food, which in turn has a substantial impact on one's psychosocial functioning as well as physical health (American Psychiatric Association [APA], 2013). Alongside psychological comorbidities such as anxiety disorders (Swinbourne et al., 2012), substance use (Bahji et al., 2019), borderline personality disorder (Martinussen et al., 2017), and depression (Hughes et al., 2013); physical health problems associated with the same include complications associated with endocrine, musculoskeletal, dermatologic, cardiovascular, gastrointestinal glands and organs (Schaumberg et al., 2017). Three commonly diagnosed eating disorders are anorexia nervosa, bulimia nervosa, and binge eating disorder.

Disordered Eating versus Eating disorders - Anorexia, Bulimia, Binge Eating

Disordered eating, which can be described as a sub-clinical level of eating disorder symptoms, may or may not be eligible for diagnosis (Anderson, 2018; Aparicio-Martinez et al., 2019). On the other hand, eating disorders warrant a diagnosis, which is done either based on the criteria examination as described in the Diagnostic and Statistical Manual (DSM-5) (APA, 2013), or the International Classification of Diseases (ICD-11) (World Health Organization, 2019).

According to the DSM-5, those who present a few eating disorder symptoms, but, do not meet the criteria for diagnoses of specific eating disorders, are often diagnosed as suffering from Eating Disorder Not Otherwise Specified (EDNOS) Anderson, (2018). Agras and colleagues (2009, pp. 565-570) described EDNOS as "a way-station for those moving from a full ED or from remission to another ED". Other Specified Feeding or Eating Disorders (OSFED), the updated and retitled version of EDNOS, includes "atypical AN, subthreshold BN and subthreshold BED, purging disorder (PD), night eating syndrome (NES), as well as unspecified feeding and eating disorders (UFED) representing cases where behaviors cause clinically significant distress/impairment of functioning, but fail to meet full criteria for a

feeding or eating disorder" (Lindvall et al., 2017, p. 56). On the other hand, according to ICD-11 standards, those presenting subthreshold eating disorder symptoms are classified under residual categories of "atypical", "other specified", and "unspecified" (Claudino et al., 2019).

While they are distinct diagnoses, there is a high degree of overlap between symptoms presented by those diagnosed with EDNOS and the symptoms presented by people suffering from anorexia nervosa, bulimia nervosa, and binge-eating disorder (Jones, 2021). Anorexia nervosa (AN), "characterized by a multi-systemic impairment due to the metabolic complications of prolonged fasting and severe malnutrition" (Proulx-Cabana et al., 2021, pp. 1-7), is associated with psychosocial and physical morbidity (Edakubo & Fushimi, 2020; Sawyer et al., 2016; Zipfel et al., 2015). Alongside being a psychiatric disease with the highest fatality rate, mainly linked with suicide and cardiac complications; which range between 2-8%, AN is also the third most common chronic disease among adolescents (Proulx-Cabana et al., 2021). This disorder has two subtypes- "restricting" (AN-R), and "binge-eating/purge" (AN-BP) (Uniacke et al., 2020).

While AN-R is characterized by restrictive eating and dietary constraints, AN-BP involves regular binge eating and purging behaviors (Culbert et al., 2016). However, there is a possibility for purging to exist without binging (APA, 2013).

While AN is characterized by restricted intake of food (Becker et al., 2019), bulimia nervosa (BN) involves rumination over body shape and weight, recurrent episodes of binge eating, and engagement in extreme behaviors aimed at controlling one's weight (Harrington et al., 2015). In the initial stages, BN is often characterized by strict dieting and associated weight loss, but eventually, the dietary restrictions evolve into cycles of repeated binge eating and weight regain. Often, those suffering from BN engage in purging in order to compensate for their binge eating episodes (Slade et al., 2018). This disorder broadly has two subtypes- "purging", in which the individual purges to compensate for the binge-eating episode, and "non-purging", wherein the person uses methods such as exercising, fasting, etc., (methods that do not involve purging) to counterbalance the potential weight gain associated with their binge eating episode (Pollatos & Georgiou, 2016). According to Mehler and Rylander (2015), self-induced vomiting is the most frequently used purging technique. Other commonly used techniques include laxative and diuretic abuse (Forney et al., 2016).

Binge eating disorder (BED), according to the DSM-5 (APA, 2013), is characterized by recurring episodes of binge eating, without indulgence in any compensatory behaviors. Binge eating, as a form of stress relief, has become increasingly common during the pandemic (AlMughamis et al., 2020; dos Santos Quaresma et al., 2021; Zachary et al., 2020).

Disordered Eating during the Covid-19 Pandemic

Symptoms of disordered eating worsened during the pandemic (Termorshuizen et al., 2020), as indicated by the National Eating Disorders Association receiving 41% more messages to its helplines in January 2021 as compared to January 2020 (Sole-Smith, 2021). A potential reason behind the worsening of disordered eating symptoms during the pandemic is Covid-19 related panic-buying and food insecurity which possibly amplified the "problematic" relationship sufferers share with food (Weissman et al., 2020). Furthermore, the unexpected change in access to treatment and face-to-face social support (Phillipou et al., 2020), and increased feelings of depression, anxiety (Rudenstine et al., 2021) and stress (Ramalho et al., 2022); all of which are associated with disordered eating (Garcia et al., 2020; Kenny et al., 2021), possibly contributed to the worsening of the same.

Social media being the most convenient source of communication has been increasingly utilized during lockdown (González-Padilla et al., 2020), which is concerning, as several studies have found a positive correlation between usage of the same and disordered eating (Derenne & Beresin, 2018; Griffiths et al., 2018; Lonergan et al., 2020; Santarossa & Woodruff, 2017; Wilksch et al., 2020). Greene and colleagues (2021) suggested in their study that there are several pro-eating disorder spaces online. Some of them utilize self-tracking of weight, food intake, etc. indirectly promoting "thinspiration" and "fitspiration". Thinspiration refers to picture-based promotion of the thin ideal on social media, whereas the latter implies encouragement of muscular bodies which are thin in nature (Griffiths & Stefanovski, 2019). This indicates that the ideal body type portrayed on social media differs for both genders, and hence, it can be assumed that the methods used by both genders are distinct from each other.

Furthermore, fatphobic and "clean eating" material circulating on social media can propagate one's disordered eating symptoms (Langmaid, 2020; Lisitsa et al., 2020; Nevin & Vartanian, 2017, pp. 37-47).

Clean eating is a phenomenon that refers to "eating behaviors that are centred on proper nutrition, restrictive eating patterns, and strict avoidance of foods considered to be unhealthy or impure" (Nevin & Vartanian, 2017, pp. 37-47, as cited in Ambwani et al., 2019). It can be hypothesized that clean eating is associated with disordered eating when the rationale behind it is weight loss, or feeling in control of one's diet. It is generally recommended that one follows a clean eating diet with caution, as extreme fixation to the regime is a presentation similar to the symptoms of anorexia, indicating that moderated clean eating may be healthy, but rigid fixation with the same may signify masking of existing disordered eating (Ambwani et al., 2019).

Causes of Disordered Eating

A study by Salafia and colleagues (2015) categorized risk factors for disordered eating as individual and sociocultural factors. Individual factors included biological predispositions, such as abnormal regulation of neurochemicals, one of which is 5-Hydroxytryptamine (5-HT), a neurochemical that Sheng and colleagues (2019, pp. 1-8) described as "an important anorexigenic factor". Furthermore, there exists evidence that food and drug cravings activate the same brain regions (Schulte et al., 2016), and that the dopamine D4 receptor underlies modulation of the reward processes associated with both, food intake as well as drug use (Botticelli et al., 2020). Also, research suggests that there is deviant activation in the fronto-striatal circuit, a brain region involved in self-regulatory control (Berner & Marsh, 2014), in those suffering from bulimia nervosa and also in those with obsessive-compulsive disorder (OCD). Specifically, that brain region is hypoactive in those with bulimia (Cyr et al., 2018), and hyperactive in those with OCD (Simon et al., 2010).

While the above risk factors are biological in nature, one's personality factors such as body dissatisfaction and difficulties with impulse control may predispose to disordered eating as well. Body dissatisfaction predicts disordered eating (Aparicio-Martinez et al., 2019, Brechan & Kvalem, 2015; Salafia et al., 2015; Vartanian et al., 2018). Internalization of societal beauty standards may contribute to one's body dissatisfaction. Females are expected to be slender and tall, that is, they are expected to uphold the "thin ideal" (Mingoia et al., 2017), whereas males are expected to have a muscular and lean physique "mesomorphic ideal" (Edwards et al., 2016). Due to these beauty standards, several women feel overweight (Brewis et al., 2011), and males may feel weak and small (Flamini, 2009). Hence, to uphold the set standard, women engage in dietary behaviors, whereas men tend to engage in activities that help them build

muscle, such as weight training, steroids intake, etc., indicating that there may be distinctions in the presentation of maladaptive eating behaviors between the two sexes (Wei et al, 2021). Other than body dissatisfaction, perfectionism (Peixoto-Plácido et al., 2015, Salafia et al., 2015; Wade et al., 2015), obsessive-compulsive personality traits, and neuroticism have been recognized as a predictor of disordered eating (Lilenfeld et al., 2006). Additionally, emotional (Mills et al., 2015; Salafia et al., 2015), physical, and sexual abuse are positively related to disordered eating (Salafia et al., 2015).

It can be assumed that fitspiration is associated with the development of athletic identity (Sahid & Soheili, 2021). An athletic identity, which refers to the "degree to which an individual identifies with the athlete role" (Brewer et al., 1993, pp. 237-254; as cited in Gapin & Petruzzello, 2011) is a risk factor for developing eating disorders. It is possible that the compulsive exercising presented by those with an athletic ideal may be to attain and maintain an athletic build (Turton et al., 2017). Furthermore, inherent competitiveness (de Sousa Fortes et al., 2015) driving one to follow nutritious eating regimens very strictly, such as clean eating; to attain a healthy physique, is expected. Based on this information, it can be assumed that there is an overlap in behaviors between healthy people with athletic ideals, and people suffering from disordered eating. Other than athletic identity, trait impulsivity, defined as "a predisposition toward rapid unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions to the impulsive individuals or to others", has been found to be linked with eating disorders (Moeller et al., 2001, pp. 1783-1793, as cited in Bénard et al., 2019). Associated with a diminished ability to inhibit one's reward-seeking behaviors (Bénard et al., 2019), patterns of impulsivity are common in the personalities of those with bulimia nervosa and binge eating disorder (Sysko et al., 2017).

Sociocultural factors predicting disordered eating included parents' dissatisfaction with their own bodies, or their child's (Hart et al., 2015; Salafia et al., 2015). Furthermore, Sheng and colleagues' (2019) study suggested that peers and environments promoting the importance of physical appearance can significantly contribute to disordered eating behaviors (Schaefer & Thompson, 2018).

Disordered Eating in India

Research on disordered eating in India is very limited, despite there being an increase in medical consultations wherein patients displayed disordered eating symptoms (Lal et al., 2015). The inadequate amount of research can be attributed to the absence of a standard diagnostic technique that can be implemented for those of Indian origin (Iyer & Shriraam, 2021; Nivedita et al., 2018) due to disparities in symptomology and experience of disordered eating within Indians themselves, and between Indians and those belonging to Western cultures.

Iyer and Shriraam (2021) found Other Specified Feeding or Eating Disorders (OSFED) to be most prevalent in the region, whereas, Pike and Dunne (2015) found psychogenic vomiting, which can be described in terms of vomiting induced by anxiety and stress (Tandon & Malhotra, 2017), to be the most common diagnosis in India. This is similar to Mammen and colleagues' (2007) study which stated in their hospital-based retrospective that 85% of the patients diagnosed with eating-related disorders were suffering from psychogenic vomiting, and 15% from anorexia nervosa. Furthermore, Riesco and colleagues' (2018) found disordered eating in India to be approximately equally prevalent among males and females. Alongside the similar prevalence, Nivedita and colleagues' (2018) study found females to have more severe disordered eating attitudes and symptoms than males.

While the above are differences within the Indian context, there are certain disparities between Indian and Western experiences of eating disorders. One of them is that Indians are less aware of feelings such as "fear of losing control over food or eating" and "being preoccupied with food, eating or their body", compared to Australians (Lal et al., 2015, p. 37). This is supported by Vaidyanathan and colleagues' (2019, pp. 311-317) study which suggested that Indians present the "non-fat phobic" variant of anorexia nervosa, that is, they express little concern regarding their body's fat and shape. This is possibly associated with "intuitive eating", a common approach to eating in Asian countries (Hawks et al., 2004, pp. 194-203). Comparable to mindful eating, a phenomenon in which one is aware of their eating behaviors and their emotional and physical reaction to it (Warren et al., 2017); in intuitive eating, individuals are encouraged to eat based on the signals their body gives them (Healy et al., 2015).

Lal and colleagues' study also established that Indians perceived their eating and exercising behaviors to be more impactful on their physical and medical health than on their relationships and social life. This is in line with the previous research which found that Indians often consulted medical doctors on experiencing disordered eating symptoms (Lal et al., 2015), instead of psychologists, and the statement pertaining to Asians in the DSM-5, "the rationale for dietary restriction is commonly related to a more culturally sanctioned complaint such as gastrointestinal discomfort", confirms the same (APA, 2013; p. 342).

Indians do not express disordered eating symptoms in a manner similar to Western countries, as explained above. This makes studying the phenomena in the region very challenging. However, the importance of studying it is highlighted by the high prevalence of disordered eating among the Indian population. Mohandoss's (2018) study found that approximately 37 females and 10 males; among 1 lakh individuals belonging to the same gender, suffered from anorexia nervosa in India. Furthermore, the Multi-Service Eating Disorders Association's (MEDA) research found that 15% of females between the ages of 17-24 are suffering from eating disorders in India (Iyer & Shriraam, 2021).

Self-Talk and Inner Voices

Including inner speech, auditory imagery, private speech, and self-statements, self-talk can be simply described as a conversation one has with oneself (Brinthaupt et al., 2009). It provides the function of behavioral and goal progress monitoring and self-regulation (Brinthaupt, 2019; Brinthaupt et al., 2009) via varied and dynamic prompts which are understood and interpreted by the user as positive, negative, motivational, or instructional in nature (Hardy, 2006). Self-talk fulfils functions such as planning, problem-solving, reasoning, motivation, attention, and plan execution (Geurts, 2018), indicating that it is an essential part of behavior change as it decreases distractions and interference in completing the task at hand (Hardy, 2006).

Brinthaupt and colleagues' (2009) study broadly divided self-talk into four factors; social assessment, self-reinforcement, self-criticism, and self-management. Social assessment self-talk, refers to self-talk related to one's social interactions. Such self-talk provides advice on how one should behave in social situations. Reinforcing self-talk indicates contemplation of events that are optimistic in nature. On the other hand, critical self-talk pertains to negative events which have the potential of making the person discouraged due to their harsh nature. Finally, managerial self-talk aids self-regulation via self-directed instruction (Brinthaupt & Kang, 2014).

Self-talk has often been equated with the phenomena of voice-hearing (McGuire et al., 1997). Inner voice describes a subjective experience, or vague perception of a voice speaking within

oneself (Heery, 1989), via the incorporation of extralinguistic elements including sounds, visual imagery, tastes, tactile sensations, smells, and kinesthetics (Hermans, 2012). Vygotsky (1962, as cited in Tullet & Inzlicht, 2010), suggested that "the inner voice develops out of self-directed speech, and that its purpose is primarily self-regulatory" (pp. 252–256). The dialogical self-theory makes a similar suggestion.

From the perspective of the dialogical self-theory, inner voices are viewed in terms of the self-constituting several varied, relatively independent, yet mutually influential I-positions (Gülerce, 2014). The I-positions can be understood as spatially located in the body, for example in the brain, in the stomach, or as in a temporal process, wherein it is relocating its position (Hermans, 2012). In their study, Trzebińska & Gabińska (2008) suggested that the I-positions have unique stories, memories, thoughts, wishes, interests, and motives, and that accordingly, each I-position can be interpreted as an "autonomous thinking and meaning making center" (pp. 215-228), indicating, I-positions have some control over one's actions. Pratt and colleagues (2001, pp. 230-231, as cited in Dimaggio & Stiles, 2007) summarized the above as "…in this perspective, a multiplicity of voices of the mind derives largely from the appropriation onto the inner mental plane of specific historical experiences of interacting with various external influences and agents (such as parents or peers), and these appear in internal conversation in the mind of the adolescent as he or she constructs a personal belief and values system".

While the concept of voice-hearing is often associated with pathology, schizophrenia in particular (Hugdahl & Sommer, 2018), it is common among healthy individuals too (Liester, 1996). This is supported by Waugh's (2015) study which states that "voice-hearing can be a feature of grief, spiritual insight, and voluntarily dissociated states such as meditation" (pp. e54-e55). Most categorize their inner voices as being malevolent, benevolent, or omnipotent in nature. Malevolent inner voices are interpreted as punishments or "undeserved persecution", whereas benevolent inner voices are interpreted as having a protective role. Simply put, inner voices are perceived as malevolent or benevolent when they are believed to have negative intent or positive intent, respectively (Chadwick & Birchwood, 1994, pp. 190-201). Omnipotence, on the other hand, refers to the inner voice's power to execute the malevolent voice's negative intention (Hugdahl, 2017).

How one believes his/her inner voice to be, elicits emotional and behavioral responses in them (Aya et al., 2019). That is, an individual may behaviorally engage with their inner voices, if they are experienced as supportive companions, by seeking them and voluntarily being guided by them. Voices which are not supportive or even evoke negative emotions may be behaviorally resisted – a person may make different attempts to avoid hearing what they say (Chadwick, 2000) As most people experiencing threatening and powerful stimuli respond with defensiveness, self-protection, and escape or submission (Birchwood et al., 2000), it can be assumed that malevolent and omnipotent voices are resisted. On the other hand, stimuli which are interpreted as benign and non-threatening draw one's attention and dependence, indicating that benevolent voices are engaged with.

Loneliness

Loneliness, described as an unpleasant and distressing experience of a perceived deficiency in interpersonal relationships, is distinct from objective social isolation (Tzouvara et al., 2015), and can be categorized as social loneliness, and emotional loneliness. Social loneliness refers to the absence of companionship, or quantitative deficiency of social networks (Dahlberg & McKee, 2014). On the other hand, emotional loneliness refers to the lack of

intimate attachment. Individualistic and collectivistic cultures ascribe varying degrees of value to different interpersonal relationships (Barreto et al., 2021). Collectivistic cultures, such as Indian culture, value interdependence and emphasize the importance of family, over friends (Barreto et al., 2021; Verma, 2020). This is supported by Rokach's (2018, pp. 59-64) study which states, "…family are of utmost importance in moderating loneliness in collectivistic cultures, and when they are missing, loneliness is experienced".

Disordered Eating and Inner Voices

Those suffering from disordered eating experience inner voices which are different from their healthy controls (Scott et al., 2014). Their inner voices revolve around eating, shape, and weight, and ensure that one derives their self-worth only through their body's shape (Noordenbos, 2014). Known as the eating disorder voice (EDV); this distinct form of inner voice occurs more frequently in those who have disordered eating, than in those who don't (Scott et al., 2014). The EDV, which is ruminative and repetitive in nature can exist before but often emerges only during the onset of disordered eating (Pugh, 2016). It is initially benign and can even be interpreted by a suffering individual as supportive as it provides "guidance and reassurance" and facilitates the "blocking of distressing emotions" (Pugh, 2016, pp. 75-83). Gradually the voice becomes more aggressive, abusive, and hostile and threatens the person's self-esteem (Bowlby et al., 2015). In line with the previous, Pugh and colleagues' (2018) study found that EDVs which were experienced and judged as powerful; predicted a more negative opinion and attitude towards eating. Hormoz and colleagues (2019) study supported the above by suggesting that the EDV's perceived malevolence and power were positively linked with the severity of eating disorder symptomology in AN, and with compensatory behaviors. Overall, it can be assumed that those with higher severity of disordered eating have more malevolent and omnipotent inner voices, and less benevolent inner voices, compared to those with less severe disordered eating, and that there exists a possibility that inner voice malevolence and omnipotence are strongly associated with disordered eating.

Disordered Eating and Self-Talk

St Clair Gibson and Foster's (2007, pp. 1029-1044) study which suggested that self-talk is "associated with both the awareness of and the generation of actions that occur in response to emotional or physical stimuli and associated physiological changes that are perceived to be relevant", sheds light on the significance of self-talk in one's action. Based on this, it can be interpreted that there exists a possible relationship between self-talk and disordered eating symptoms.

Considering Monteleone and colleagues' (2020, pp. 160-166) study which suggested that those suffering from disordered eating experience "heightened social threat sensitivity", it can be hypothesized that those who have intense problems with food intake experience elevated levels of social assessment self-talk. This is supported by Verplanken and Tangelder's (2011) study which suggested, social evaluation of self is common among those with disordered eating. Self-talk which is about the social evaluation of oneself revolves around preparing for a conversation, concluding discussions, and formulating alternate conversational circumstances (Oleś et al., 2020). An example of the social assessment self-talk is reflected in the following sentence, "When they say things like "you're looking well", what they're really meaning is how much weight I've put on" (Scott et al., 2014, p.14).

The construct of control in obsessive-compulsive disorder (OCD), is shared by eating disorders, indicating a possible underlying similarity between the two (Froreich et al., 2016;

Vartanian & Grisham, 2012). Specifically, "both disorders are characterised by a fear of losing self-control" (Froreich et al., 2016, p. 14), signifying that the feeling of control is potentially valuable to those suffering from disordered eating. This potential need for control combined with the suggestion that "….self-talk facilitates emotional control without recruiting cognitive control" (Moser et al., 2017, p. 4519) denotes that those suffering from disordered eating voluntarily and possibly unintentionally indulge in self-talk, henceforth demonstrating high self-talk frequency, similar to those with OCD (Brinthaupt, 2019).

Considering the overlap between OCD and disordered eating, it can be predicted that critical self-talk, which is directly associated with obsessive-compulsive behaviors (Damirchi et al., 2020), shares similar associations with disordered eating symptoms. This is backed by Damirchi and colleagues' (2020) conclusion that self-talk which is critical or related to social assessment is directly associated with intrusive thoughts, a characteristic symptom among those with disordered eating (Kinkel-Ram et al., 2021). Self-talk such as, "I feel out of shape", and "I'm really upset with my exercise habits" indicates the presence of self-criticism.

Unlike the direct relations one can draw between critical and social assessment self-talk and intrusive thoughts, self-management is predicted to reduce the occurrence of thoughts that are interfering in nature, allowing one to work towards their goal (Sadri Damirchi et al., 2020). Hence, an indirect association between management self-talk and disordered eating can be assumed, that is, when management self-talk increases, disordered eating symptom severity decreases, and vice-versa. "That food/eating situation is dangerous. I'm going to have to be really careful about what I eat" is an illustration of self-management talk (Scott et al., 2014, p.14).

Reinforcing self-talk is associated with positive self-statements (Brinthaupt et al., 2009), which are linked with healthy eating habits (Kinsaul et al., 2014), and can potentially decrease the occurrence of critical self-talk (Brinthaupt et al., 2014). Therefore, one could assume that reinforcing self-talk, demonstrated by statements such as "I feel good about eating something healthy", and "I feel good about exercising" (Long, 2017), is inversely related to disordered eating. Overall, it can be predicted that disordered eating is directly/positively associated with social assessment self-talk, critical self-talk and self-talk frequency, and indirectly/negatively associated with reinforcing and management self-talk. In other words, those presenting a high level of disordered eating symptom severity also demonstrate high self-talk frequency, social assessment self-talk, and critical self-talk, and a comparatively lower level of reinforcing and management self-talk.

Disordered Eating and Loneliness

Junttila and colleagues' (2015) study found that social loneliness predicted disordered eating more strongly than emotional loneliness. Levine's (2012) study backed the same. This can be explained in terms of Rance and colleagues' (2017) study which found that those who are suffering may experience difficulty because of a "lack of understanding…..they perceived in society" (pp. 127-136). Richardson and colleagues' (2017) study found a bi-directional relation between the two. This bi-directionality can be explained in terms of the finding that social media usage, loneliness levels (Savci & Aysan, 2016), and disordered eating severity are positively correlated (Walker et al., 2015), and as mentioned previously, social-media usage has increased exponentially.

Hypotheses

Based on the above-mentioned information, this study predicts the following:

- Those with more severe disordered eating have a higher intensity of social assessment, and critical self-talk and less reinforcing and self-management self-talk, than those with less severe disordered eating.
- Those with higher disordered eating symptom severity are likely to demonstrate higher self-talk frequency, than the group with lower disordered eating symptom severity.
- Those with higher levels of disordered eating, as compared to lower disordered eating symptom severity counterparts, have higher inner voice malevolence, and omnipotence, alongside lower levels of inner voice benevolence.
- Malevolence and omnipotence of inner voices predict disordered eating.
- Those with more severe disordered eating experience higher levels of loneliness in relation to their lower severity disordered eating counterparts.

METHODOLOGY

Participants

The survey link for this study circulated on social media platforms including WhatsApp, Facebook, Instagram, and Snapchat. Indians who were between the ages of 18 and 28 (M=22.11, SD=1.83), and fluent in spoken English were eligible to participate in the study. In total, 160 volunteered to do the survey, from which one person did not consent to participate, four participants did not meet the eligibility criteria and fifty-five others dropped out mid-survey. Of the 160 volunteers, 105 met the eligibility criteria and completed the entire survey. Among them, 65 identified as female, and 40 as male.

Measures used

All the scales mentioned below were administered in an online format in the English language.

A version of the Eating Disorder Examination-Questionnaire (EDE-Q) (Fairburn & Beglin, 1994), which was adapted and validated for the Indian population (Lewis-Smith et al., 2021), was used to measure the clinical features of one's disordered eating. The version of the EDE-Q used in this study is a self-report measuring tool divided into two subscales, "preoccupation and control", and "weight and shape concerns". Males had to answer 18 questions (11 questions in the former subscale and 7 in the latter), and females answered 15

questions (7 questions in the former subscale and 8 in the latter).*[3]

In the EDE-Q version adapted to the Indian population, the original "Weight Concern" and "Shape Concern" subscales, and "Restraint" and "Eating Concern" subscales have been combined to make "Weight and Shape Concerns" and "Preoccupation and Control" subscales, respectively. Basically, the original questionnaire's subscales have been dissolved and rebuilt to formulate a culturally relevant two-factor structure for both genders. Furthermore, the

[3]*The discrepancies in the number of questions males and females answered is possibly due to the adaptation of the original questionnaire to the Indian population. Retention and deletion of several questions took place to ensure high validity and reliability ("items that cross-loaded >0.25 on more than one factor, and/or had unsatisfactory loadings <0.40 on a single factor and/or did not load on any factor, were omitted"), cultural acceptability (deletion of questions related to menstruation and contraception as they wouldn't be considered culturally appropriate), and gender-based relevance (for example, desire for a flat stomach is generally associated with females rather than males) (Lewis-Smith et al., 2021, pp. 187-202).

addition of questions from other subscales of the original questionnaire has been done to grasp the model of disordered eating among Indians (Lewis-Smith et al., 2021).

The "Weight and Shape Concerns" subscale pertained to one's concern over their body's structure, and heaviness, whereas the "Preoccupation and Control" subscale was associated with one's preoccupation with avoiding foods that have high caloric content or their fixation on thoughts about eating and food. The control part of the subscale included monitoring one's intake of food (Podar et al., 1999). The former subscale was marked on the 4-point Likert scale varying between "0 days", to "6-7 days", and the latter was marked on the 7-point Likert scale varying between "not at all" to "very much so" (Lewis-Smith et al., 2021, pp. 187-202). Lewis- Smith and colleagues' (2021) study found that, for females, the EDE-Q demonstrated moderate test-retest reliability ranging between 0.28 and 0.74 for females, and 0.25 and 0.58 for males.

Additionally, it demonstrated high internal consistency of α=0.91, for both males and females.

Self-Talk Scale (STS) (Brinthaupt et al., 2009), a self-report measuring tool, was used to examine different factors of self-talk and its overall frequency. Comprising four subscales "social assessment", "self-reinforcement", "self-criticism", and "self-management"; with four questions per subscale, respondents provided their answers on a 5-point scale varying between "never" to "always" across 16 questions. The subscales demonstrated test-retest reliabilities of r=0.71 for social assessment; r=0.56 for self-criticism; r=0.50 for self-reinforcing; and r=0.64 for self-management. Overall, the scale had test-retest reliability of r=0.69. All subscales demonstrated high internal consistency at; α=0.82, α=0.89, α=0.83, and α=0.79, for social assessment, self-reinforcement, self-criticism, and self-management, respectively (Brinthaupt et al., 2009).

The Revised version of the **Beliefs about Voices questionnaire** (Chadwick et al., 2000), a self-report measuring tool, was used to measure one's beliefs about their inner voices, alongside their emotional and behavioral reactions to them. Responding to questions included in broadly 5 scales: "malevolence", "benevolence", "omnipotence", "engagement", and "resistance", participants rated their responses on a 4-point scale varying between "disagree" to "agree strongly". The tool has high test-retest reliability at r=0.89 (Chadwick & Birchwood, 1995), as well as high internal consistency within scales at; α=0.84, α=0.88, α=0.74, α=0.87, and α=0.85, for the malevolence, benevolence, omnipotence, engagement, and resistance, respectively (Chadwick et al., 2000). The engagement and resistance scales are further divided into emotion-based and behavior-based subscales (Chadwick et al., 2000).

3-Item Loneliness Scale (Igarashi, 2019), a self-report tool, measures one's loneliness on a 5-point likert scale. Participants are asked to indicate their loneliness levels on a scale of "hardly ever", "some of the time", and "often". The scale has a satisfactory test-retest intraclass correlation coefficient at ICC=0.83 (Trucharte et al., 2021), and high internal consistency, α=0.81 (Igarashi, 2019). While both social and emotional loneliness were analyzed by this questionnaire, it only produced one result indicating overall loneliness.

Procedure

Data collection was conducted between December 2021 to March 2022. The survey was administered online. The participants first consented to participate in the study after going through the informed consent which broadly mentioned the purpose of the study, the amount of time required to finish the survey, informed the participant of confidentiality and provided

contact details for queries and feedback. At the bottom of the same page, an agreement to participate in the survey was added. Knowing the previous information, if the participant agreed to the conditions, he/she could proceed to the demographic questionnaire. In case he/she chose to disagree, they were taken to the end of the survey. In the demographic questionnaire, participants confirmed their gender, age, and nationality for eligibility screening. Those who were eligible to participate, that is, Indians in the age bracket of 18-28 with a good command of spoken English proceeded to fill in the Eating Disorder Examination-Questionnaire (EDE-Q), followed by the Self-Talk Scale (STS), followed by the Revised version of Beliefs about Voices questionnaire, and finally answered the 3-Item Loneliness Scale. The survey was formatted to prohibit participants from proceeding without answering all questions however, they had the option of going back and changing their responses. The survey ended with an optional possibility to leave one's enquiry/feedback alongside one's email ID for the researcher to get in touch with them regarding the same. Participation in this study was voluntary.

RESULTS

Main analyses

Descriptive statistics

Statistical analyses were conducted taking into account 105 participants. Demographic indicators included gender, age, and nationality. The results of four questionnaires, with a cumulative total of twelve subscales, were analyzed in this study.

As the sample size was above 100, the Kolmogorov-Smirnov test was used to test normality distribution. Results indicated that preoccupation and control, and weight and shape concern; among females, all factors of self-talk (social assessment, reinforcing, critical, and management), inner voice; malevolence, benevolence, omnipotence, behavioral engagement, emotional and behavioral resistance, and overall resistance and loneliness levels were non-normally distributed. Table 1 contains descriptive statistics of all the subscales and variables used in the research.

Table 1 Descriptive statistics of variables included in analyses (N=105)

	N	Mean	SD	Min.	Max.	K-S
Preoccupation and control in males	40	23.78	7.66	13	44	0.119
Weight and shape concerns in males	40	21.48	10.11	7	42	0.200
Disordered eating severity in males	40	45.25	16.11	22	86	0.200
Preoccupation and control in females	65	14.13	5.31	7	27	0.018
Weight and shape concerns in females	65	24.42	12.22	8	54	0.001
Disordered eating severity in females	65	38.57	15.93	16	81	0.087
Disordered eating severity	105	41.11	16.25	16	86	0.059
Social assessment self-talk	105	13.34	3.30	4	20	0.000
Reinforcing self-talk	105	12.90	3.41	4	20	0.023
Critical self-talk	105	13.76	3.45	4	20	0.001
Management self-talk	105	12.62	3.55	4	20	0.044
Self-talk frequency	105	52.63	12.53	16	80	0.200
Inner voice malevolence	105	9.29	3.62	6	24	0.000
Inner voice benevolence	105	16.14	3.80	6	24	0.019
Inner voice omnipotence	105	12.31	3.05	6	24	0.000
Emotional engagement	105	11.39	2.75	4	16	0.081
Behavioral engagement	105	9.49	2.90	4	16	0.012
Engagement	105	20.88	5.00	8	32	0.185
Emotional resistance	105	6.94	2.78	4	16	0.000
Behavioral resistance	105	8.49	3.23	5	20	0.000
Resistance	105	15.43	5.47	9	36	0.000
Loneliness	105	6.25	1.69	3	9	0.000

The participants were divided into low-and high-level groups in the areas of disordered eating and loneliness in order to test the stated hypotheses, by recoding the responses of those in the lowest and highest quartiles for analyses as 1 (low level), and 2 (high level). This was done by studying the frequencies table and categorizing the responses of those whose sum total fell within the lowest 25% (0-25%) of the sample as 1, and those whose sum total fell within the highest 25% (75%-100%) as 2. Responses of participants falling outside of these two categories were not recoded as they were not included in the analysis. There were 25 participants in the low severity disordered eating group and 28 in the high severity disordered eating group and 33 participants in the low loneliness level group and 43 in the high loneliness level group.

The following analyses have been conducted after the deletion of outliers, based on boxplots generated during the normality distribution evaluation. The normality distribution was individually conducted for each analysis, after the division of eating disorder symptom severity and loneliness levels into low and high groups.

Factors of Self-talk and Disordered Eating

A normality test run between self-talk factors as the dependent variable (DV) and disordered eating severity as the independent variable (IV) revealed normal distribution, hence a parametric test has been conducted. An Independent Samples t-test revealed that those who have more severe disordered eating (N=27), also have significantly higher levels of social assessment self-talk (M=14.96, SD=2.93), reinforcing self-talk (M=15.00, SD=3.19), critical self-talk (M=16.07, SD=2.97) and management self-talk (M=14.89, SD=3.59), than those with lower severity of disordered eating (N=26), (M=11.88, SD=2.93), (M=11.73, SD=3.34), (M=12.12, SD=3.47), and (M=11.23, SD=3.17), at $t= -3.83$, $p<0.001$, $d=1.05$; $t= -3.64$, $p<0.01$, $d=1.00$; $t= -4.47$, $p<0.001$, $d=1.22$; and $t= -3.92$, $p<0.001$, $d=1.08$, respectively.

A regression analysis run between self-talk factors (social assessment, reinforcing, critical and management; self-talk) as predictors and disordered eating severity as the DV, revealed that the predictor significantly predicted the DV, $F(4,99) =4.94$, $p<0.01$. The adjusted R square was 0.133, implying that 13.3% of the variance can be explained by the IV.

Self-talk Frequency and Disordered Eating

A normality test run between self-talk frequency as the DV and disordered eating severity as the IV revealed normal distribution, hence a parametric test has been conducted. The Independent Samples t-test revealed that those who have more severe disordered eating (N=28) have significantly higher self-talk frequency (M=60.43, SD=11.60 than those with lower severity of disordered eating (N=26) (M=46.96, SD=12.01), $t= -4.19$, $p<0.001$, $d=1.14$.

A regression analysis run between self-talk frequency as predictor and disordered eating severity as the DV, indicates that the predictor significantly predicted the DV, $F(1,103) =15.79$, $p<0.001$. R square was 0.133, implying that 13.3% of the variance can be explained by the IV. The analysis revealed that $\beta=0.37$ and $B=0.47$, indicating that when self-talk frequency increases by 1-unit, disordered eating severity increases by 0.47 units.

Inner Voices and Disordered Eating

A normality test run between malevolence of inner voice as the DV and disordered eating severity as the IV revealed skewed distribution, hence a non-parametric test has been conducted. The Mann-Whitney U test revealed significant differences, $U=130.00$, $p<0.01$. Those with higher severity of disordered eating (N=26) believe their inner voices to be

significantly more malevolent (Mrank=32.50) (M=10.85, SD=4.19), than those with lower severity of disordered eating (N=24) (Mrank =17.92) (M=7.29, SD=1.30).

A normality test run between omnipotence of inner voice as the DV and disordered eating severity as the IV revealed normal distribution, hence a parametric test has been conducted. An Independent Samples t-test conducted revealed that those who have more severe disordered eating believe their inner voices to be significantly more omnipotent (N=26) (M=13.46, SD=2.35), than those with lower severity of disordered eating (N=24) (M=11.08, SD=3.01), t= - 3.13, $p<0.01$, d=0.88.

A regression analysis run between malevolence and omnipotence as predictors and disordered eating as the DV, indicated that the predictors significantly predicted the DV, $F(2,98)=14.70$, $p<0.001$. The adjusted R square was 0.215, implying that 21.5% of the variance can be explained by the IVs. Only inner voice malevolence had a relationship with disordered eating, at $\beta=0.41$ and B=2.03, indicating that when inner voice malevolence increases by 1-unit, disordered eating severity increases by 2.03 units.

Self-talk Frequency, Inner Voice Nature, and Disordered Eating

Regression analyses run between self-talk frequency, and inner voice malevolence as predictors of disordered eating, separately (linear regression) and together (multiple regression), revealed significant findings. Self-talk frequency predicted disordered eating at, $F(1,103)$

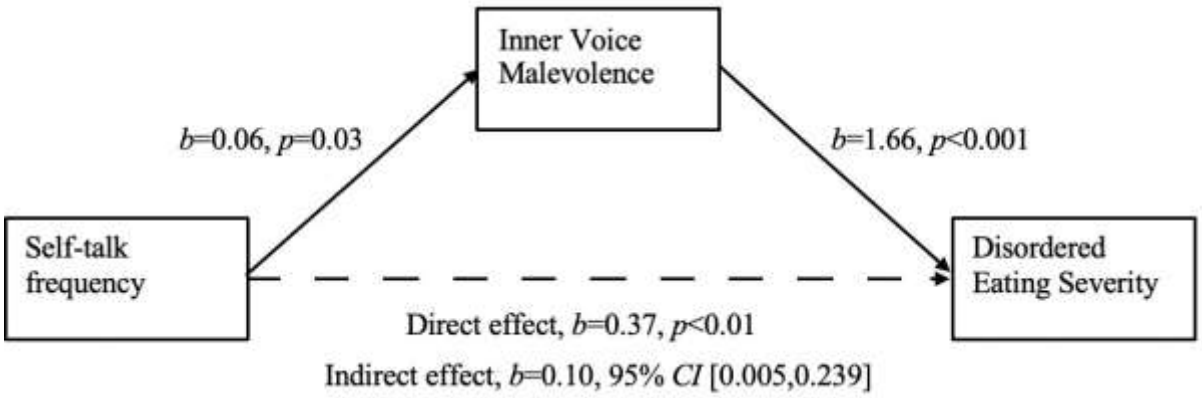
$=15.79$, $p<0.001$. R square=0.133, $\beta=0.37$ and B=0.47 implying that 13.3% of the variance in disordered eating severity can be explained by self-talk frequency, and when self-talk frequency increases by 1-unit, disordered eating severity increases by 0.47 units.

Inner voice malevolence predicted disordered eating at, $F(1,103) =24.43$, $p<0.001$. R square=0.185, $\beta=0.43$ and B=1.93 implying that 18.5% of the variance in disordered eating severity can be explained by inner voice malevolence, and when inner voice malevolence increases by 1-unit, disordered eating severity increases by 1.93 units.

The multiple regression analysis run between self-talk frequency and inner voice malevolence as predictors, and disordered eating as the DV, revealed significant results, $F(2,102)=18.29$, $p<0.01$. The adjusted R square was 0.250, implying that 25.0% of the variance can be explained by the IVs. The analysis revealed that inner voice malevolence was a stronger predictor of disordered eating severity, $\beta=0.37$ and B=1.66, than self-talk frequency, $\beta=0.29$ and B=0.37. When inner voice malevolence and self-talk frequency increase by 1-unit, disordered eating severity increases by 1.66 units and 0.37 units, respectively.

As the regression analyses between self-talk frequency and inner voice malevolence as predictors, and disordered eating as the DV revealed significant results, a mediation analysis was run.

Figure 1



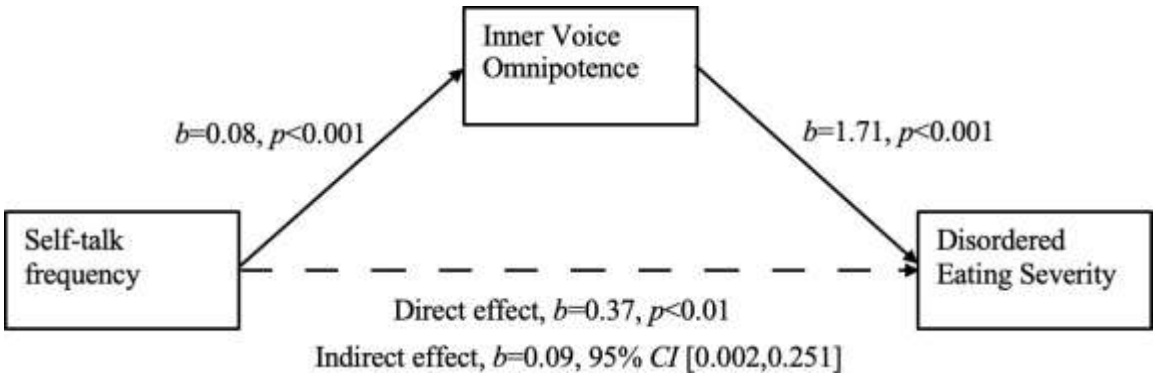
A mediation analysis (presented in Figure 1) has been conducted on self-talk frequency as the predictor, inner voice malevolence as the mediator, and disordered eating severity as the outcome. Based on the data it may be concluded that there is a significant indirect (mediation) effect of self-talk frequency on disordered eating severity through the malevolence of inner voice, b=0.10, 95% CI [0.005,0.239]. (This analysis was conducted without deletion of outliers).

Regression analyses run between self-talk frequency, and inner voice omnipotence as predictors of disordered eating, separately (linear regression) and together (multiple regression), revealed significant findings. Inner voice omnipotence predicted disordered eating severity at, $F(1,103) = 11.73$, $p<0.001$. The R square=0.102, β=0.32 and B=1.70 implying that 10.2% of the variance in disordered eating severity can be explained by inner voice omnipotence, and when inner voice omnipotence increases by 1-unit, disordered eating severity increases by 1.70 units.

Inner voice omnipotence and self-talk frequency predicted disordered eating severity at, $F(2,102) = 10.85$, $p<0.01$. The adjusted R square was 0.159, implying that 15.9% of the variance can be explained by the IVs. The analysis revealed that inner voice omnipotence was a stronger predictor of disordered eating severity, β=0.22 and B=1.71, than self-talk frequency, β=0.29 and B=0.37. When inner voice omnipotence and self-talk frequency increase by 1-unit, disordered eating severity increases by 1.71 units and 0.37 units, respectively.

As the regression analyses between self-talk frequency and inner voice omnipotence as predictors, and disordered eating as the DV revealed significant results, a mediation analysis was run.

Figure 2



A mediation analysis (presented in Figure 2) has been conducted on self-talk frequency as the predictor, inner voice omnipotence as the mediator, and disordered eating severity as the outcome. Based on the data it may be concluded that there is a significant indirect (mediation) effect of self-talk frequency on disordered eating severity through the omnipotence of inner voice, b=0.09, 95%CI (0.002,0.251). (This analysis was conducted without deletion of outliers).

Loneliness and Disordered Eating

A normality test run between loneliness as the DV and disordered eating severity as the IV revealed normal distribution, hence a parametric test has been conducted. An Independent Samples t-test conducted revealed that those who have more severe disordered eating were lonelier (N=43) (M=47.09, SD=16.76), than those with lower severity of disordered eating (N=33) (M=34.73, SD=12.68), t= -3.53, p<0.01, d=0.83.

Additional analyses

Disordered Eating Severity among Males versus Females

A normality test run between disordered eating severity as the DV and gender as the IV revealed a normal distribution, hence a parametric test has been conducted. An Independent Samples t-test conducted revealed that males have more severe disordered eating (N=45) (M=45.25, SD=2.5), than females (N=60) (M=38.57, SD=15.93), t= 2.08, p=0.04, d=0.58.

Self-talk and Inner Voices

A normality test run between self-talk factors and nature of inner voices revealed a normal distribution; hence a parametric test has been conducted. The results of Spearman's correlation between the factors of self-talk, nature of inner voices, and engagement and resistance to self-talk are presented in Table 2. The analysis revealed several weak and direct correlations. Social assessment self-talk and reinforcing self-talk are correlated with inner voice benevolence and emotional engagement. Critical self-talk shares a correlation with inner voice malevolence, inner voice omnipotence, emotional engagement, behavioral engagement and behavioral resistance, and management self-talk is associated with inner voice benevolence, inner voice omnipotence, and emotional engagement.

Table 2 Self-talk and Inner Voices (N=92)

Social Assessment ST		Reinforcing ST	Critical ST	Management ST
Malevolence	-	-	0.224* 0.032	-
Benevolence	0.219* 0.036	0.208* 0.046	-	0.226* 0.030
Omnipotence	-	-	0.224* 0.032	0.273** 0.008
Emotional Eng.	0.237* 0.023	0.261* 0.012	0.221* 0.034	0.247* 0.018
Behavioral Eng.	-	-	0.224* 0.032	-
Emotional Res.	-	-	-	-
Behavioral Res.	-	-	0.205* 0.050	-

*** Correlation is significant at the 0.01 level*
** Correlation is significant at the 0.05 level*

Nature of Inner Voice and Engagement versus Resistance

A normality test run between engagement versus resistance of inner voice, and nature of inner voices revealed a normal distribution; hence a parametric test has been conducted. The results of Spearman's correlation between the nature of inner voices and engagement and resistance of the same are presented in Table 3. The analysis revealed several weak, moderate and strong; direct correlations. Inner voice malevolence shares a moderate; positive correlation with emotional and behavioral; resistance, and a strong; direct correlation with overall resistance. On the other hand, inner voice benevolence is strongly associated with emotional, behavioral and overall; engagement. Furthermore, inner voice omnipotence shares; a weak correlation with emotional, behavioral, and overall; resistance, a moderate correlation with emotional and behavioral engagement, and a strong correlation with overall engagement.

Table 3 Nature of Inner Voice and Engagement versus Resistance (N=95)

	Emotional Engage.	Behavioral Engage.	Overall Engage.	Emotional Resist.	Behavioral Resist.	Overall Resist.
Malevolence	-	-	-	0.488** 0.000	0.486** 0.000	0.548** 0.0000
Benevolence	0.672** 0.000	0.576** 0.000	0.723** 0.000	-	-	-
Omnipotence	0.410** 0.000	0.476** 0.000	0.504** 0.000	0.242* 0.018	0.259* 0.011	0.286** 0.005

*** Correlation is significant at the 0.01 level*
** Correlation is significant at the 0.05 level*

Loneliness and Self-talk

A normality test run between loneliness as the DV and function of self-talk as the IV revealed normal distribution, hence a parametric test has been conducted. An Independent Samples t-test revealed that those who have higher levels of loneliness (N=42), also have significantly higher levels of reinforcing self-talk (M=13.93, SD=3.02), critical self-talk (M=14.98, SD=3.20) and management self-talk (M=13.57, SD=3.32), than those with lower levels of loneliness (N=30), (M=12.07, SD=2.59), (M=13.43, SD=2.51), and (M=12.00, SD=3.17), at

t= -2.73, p<0.01, d=0.66; t= -2.19, p=0.03, d=0.54; and t= -2.02, p=0.048, d=1.21, respectively.

Loneliness and Nature of Inner Voices

A normality test run between loneliness as the DV and nature of inner voice as the IV revealed skewed distribution, hence a non-parametric test has been conducted. A Mann-Whitney U test conducted to compare the perceived malevolence of inner voices of those with low versus high levels of loneliness revealed significant differences between the two, U=409.50, p<0.01.

Those with higher levels of loneliness interpret their voice as significantly more malevolent (N=43) (Mrank=45.48) (M=10.49, SD=3.96), than those with lower levels of loneliness (N=33) (Mrank =29.41) (M=7.91, SD=2.27).

A regression analysis run between malevolence as predictor and loneliness as the DV, indicated that the predictor significantly predicted the DV, F(1,103) =10.74, p<0.01. The R square was 0.094, implying that 9.4% of the variance can be explained by the IV. β=0.31 and B=0.14, indicating that when inner voice malevolence increases by 1 unit, loneliness increases by 0.14 units.

Summary tables

Table 4 presents a brief summary of the results pertaining to the severity of disordered eating.

Table 4. Summary table: The following table lists the independent variables whose levels significantly differ when comparing those with low versus high severity of disordered eating.

	N	Low severity DE	*N*	High severity DE
Social assessment self-talk	26	*M*=11.88, *SD*=2.93	27	*M*=14.96, *SD*=2.93
Reinforcing self-talk	26	*M*=11.73, *SD*=3.34	27	*M*=15.00, *SD*=3.19
Critical self-talk	26	*M*=12.12, *SD*=3.47	27	*M*=16.07, *SD*=2.97
Management self-talk	26	*M*=11.23, *SD*=3.17	27	*M*=14.89, *SD*=3.59
Self-talk frequency	26	*M*=46.96, *SD*=12.01	28	*M*=60.43, *SD*=11.60
Inner voice malevolence	24	*M*=7.29, *SD*=1.30	26	*M*=10.85, *SD*=4.19
Inner voice omnipotence	24	*M*=11.08, *SD*=3.01	26	*M*=13.46, *SD*=2.35
Loneliness	33	*M*=34.73, *SD*=12.68	43	*M*=47.09, *SD*=16.76

Table 5 presents a brief summary of the results pertaining to the level of loneliness.

Table 5. Summary tables: The following table lists the independent variables whose levels significantly differ among those with low versus high severity of loneliness.

	N	Low level of loneliness	*N*	High level of loneliness
Overall/Sum disordered eating	*33*	*M*=34.73, *SD*=12.68	*43*	*M*=47.09, *SD*=16.76
Reinforcing self-talk	*30*	*M*=12.07, *SD*=2.59	*42*	*M*=13.93, *SD*=3.02
Critical self-talk	*30*	*M*=13.43, *SD*=2.51	*42*	*M*=14.98, *SD*=3.20
Management self-talk	*30*	*M*=12.00, *SD*=3.17	*42*	*M*=13.57, *SD*=3.32
Inner voice malevolence	*33*	*M*=7.91, *SD*=2.27	*43*	*M*=10.49, *SD*=3.96

DISCUSSION

The aim of this research was to study how disordered eating symptom severity is associated with nature, function, and frequency of self-talk and loneliness among English-speaking

Indians within the age range of 18-28. To the knowledge of the author, this is the first research that studies disordered eating as associated with different factors of self-talk.

This study predicted those with higher levels of disordered eating symptom severity will demonstrate higher levels of social assessment and critical self-talk, overall self-talk frequency, intensity of inner voice malevolence and omnipotence, and loneliness, than their lower severity counterparts. On the other hand, it was expected that they would present lower levels of reinforcing and management self-talk, and the intensity of benevolent inner voice, than those with lower severity of disordered eating symptoms.

The statistical analysis revealed, as expected, that those with higher levels of disordered eating symptom severity, as compared to their lower severity counterparts, had higher levels of critical and social assessment self-talk, as well as higher self-talk frequency. The significant results generated by regression analyses in this study backed the same. These results are similar to those generated by Noordenbos and colleagues' (2014) study, which found that those belonging to the eating disorder group reported higher levels of self-criticism as compared to the control group. The higher symptom severity group also demonstrated more malevolent and omnipotent inner voices, and loneliness levels, consistent with the suggestions of Pugh and Waller's (2016a; 2016b), and Scott and colleagues' (2014) studies.

However, unlike predicted, the group with higher disordered eating symptomology presented higher levels of reinforcing and management self-talk. The reinforcing self-talk is possibly associated with the rewarding sensation of losing weight, and the praise and acknowledgment received from others, for the same. Often the dietary behaviors are continued with the aim of obtaining more validation for methods that are "working", and are preserved as a function of fear of regaining the lost weight (Taylor, 2020). Another explanation for the unexpected results could be that, those with disordered eating exercise compulsively, that is, they experience an inability to stop exercising as they aim for thinness and perfection (Holland & Tiggemann, 2017; Turton et al., 2017). Similar exercising patterns are often presented by athletes (Holland et al., 2014), and those with an athletic identity (Turton et al., 2017). St Clair Gibson and Foster (2007) found that most people who exercise indulge in positive self-talk during the same, explaining the reinforcing self-talk. On the other hand, the higher level of management self-talk is possibly linked with self-motivation, self-direction (Neck & Manz, 1992), goal-setting, and goal-evaluation (Moore et al., 2000), constructs that underlie the strict regimes that predispose one to disordered eating, and later act as mechanisms propagating the same (Conviser et al., 2018; Wilksch et al., 2020).

The associations between disordered eating symptom severity and inner voice malevolence, and omnipotence were as expected. Their direct association is similar to that found in Aya and colleagues' (2019) study. The same study also found results indicating higher inner voice frequency among those with disordered eating, similar to this study's results. However, malevolence as the predictor of disordered eating to the largest extent; differs from Pugh and Waller's (2016a) study which found no association between the two, but it is in line with another study which found that those with bulimia nervosa reported their inner voice to be malevolent in nature (Pugh et al., 2018). It is also supported by Fox and colleagues (2004) study which stated that "all, or nearly all, participants viewed the voice as malevolent" (pp. 511-531).

Mediation analyses revealed that disordered eating severity is mediated by inner voice malevolence and omnipotence when self-talk frequency is the predictor. While the findings

are unique as compared to other studies which found self-talk to be associated with motivation (Gammage et al., 2001; Hardy, 2006; Park et al., 2020), goal orientation (Latinjak et al., 2020; McCormick et al., 2018; Van Raalte et al., 2016), and performance enhancement (is et al., 2016; Hatzigeorgiadis et al., 2014; Van Raalte et al., 2016), they are supported by Łysiak's (2019, p.1663) study which found that "people characterized as having anxiousness, and separation insecurity (high negative affectivity), with unusual beliefs and experiences, as well as eccentricity (high psychoticism), are prone to having ruminative and confronting dialogues".

While most of the above-mentioned studies which found self-talk to be beneficial were conducted on athletes, who generally have better mental health than non-athletes (Dehkordi, 2011), the results of this study indicate that the function and nature of self-talk and inner voices are important to their outcome. This is confirmed by Kim and colleagues (2021) study which found that one's brain state is differently modulated with regards to cognitive performance, on activating positive versus negative self-talk. For example, Basset and colleagues' (2022) study found that those who activated negative self-talk had higher salivary cortisol as compared to those who were in the positive self-talk group. While novel and distinct, the mediation analyses results must be explored with caution as the outliers were not deleted for the analysis, increasing the chances of a Type 1 error associated with bootstrapping (Creedon & Hayes, 2015; Koopman et al., 2015). That is, while the mediation analyses demonstrate that self-talk frequency predicts disordered eating through inner voice malevolence and omnipotence as mediators, there exists a possibility that the null hypothesis has been falsely rejected.

Other than the above, this study found that males reported higher severity of disordered eating symptomology, as compared to females. This result highlights the importance of conducting disordered eating analyses on men, as they have been overlooked in several studies possibly due to their unique presentation of the same. That is, while females make efforts to lose weight by following diet patterns that reduce calorie intake, males often increase their intake of calorie and protein-rich foods in order to attain a muscular physique (Zhao et al., 2020). Considering that such eating behaviors are nutritious when done in healthy proportions, it is challenging to analyze the presence and severity of disordered eating among males who aim to achieve the mesomorphic ideal. A potential reason behind this study's unique finding is that the questionnaire measuring disordered eating was gender-specific, and males answered more questions than females. The larger quantity of questions probably leads to a higher level of exploration of own symptoms, and behaviors, hence the more severe presentation.

Further analyses were conducted to check for associations between and within self-talk, inner voices, and loneliness variables. A Spearman's correlation between factors of self-talk and nature of inner voices found that social assessment and reinforcing self-talk are both associated with benevolent inner voices, and are engaged with emotionally. Though the correlations were weak, they can be explained as them sharing a direct association within themselves, as both benevolent inner voices, and reinforcing voices; are positively associated with self-compassion (Blue et al., 2013; Grzybowski, 2021). The correlation between social assessment self-talk, benevolent inner voices, and emotional engagement is justified by Zourbanos and colleagues (2011) that suggested that perceived social support is associated with positive self-talk.

Other than social assessment and reinforcing self-talk, even critical self-talk was emotionally engaged with. Furthermore, it was associated with inner voice malevolence and omnipotence

and was engaged with and resisted, behaviorally. This is consistent with Aya and colleagues (2019), and Blue's (2002) study which found that critical self-talk is associated with inner voice malevolence, and is resisted. Furthermore, Blue's (2002) study finding that omnipotent dialogues are engaged with and resisted, behaviorally supported this study's result. The finding that critical self-talk is emotionally engaged with is unique. However, the correlation between them was weak. One way in which this association can be explained is that some people find negative self-talk to be motivating in nature (Hardy, 2006), and Park and Yun's (2018) study found that emotional engagement generally predicted motivation.

The Spearman's correlation also found that management self-talk is associated with inner voice benevolence and omnipotence, and is engaged with emotionally. This finding is similar to that of Chadwick & Birchwood's (1994) study which mentioned that managerial self-talk is associated with inner voice omnipotence. The association between management self-talk and inner voice benevolence can be understood in terms of the former representing "more positive aspects of self" (Brinthaupt et al., 2009, pp. 82-92), which possibly draws one's benevolent inner voice's activity, which is in turn engaged with emotionally (Blue, 2002).

Another Spearman's correlation was run to check how the malevolent, benevolent, and omnipotent inner voices are engaged with and resisted. It revealed emotional and behavioral resistance to malevolent inner voices and emotional and behavioral engagement with benevolent inner voices. This is in line with Birchwood and colleagues (2000), and Aya and colleagues (2019) studies. The omnipotent inner voices were engaged with and rejected, emotionally and behaviorally. While the rejection can be explained in terms of the inner voices being overpowering and threatening (Birchwood et al., 2000), the engagement can be understood as those with disordered eating viewing their voice "as a strong and wise (authoritative) secure base that patients are likely to comply with" (Forsén Mantilla et al., 2019, pp. 379-393).

Analysis pertaining to loneliness and self-talk found that the former is directly associated with reinforcing, critical, and management self-talk. The association between critical self-talk and loneliness is comparable to that of Ford's (2015) study. Similar results pertaining to the association between reinforcing self-talk and loneliness were obtained in Reichl and colleagues (2013) study. The association between reinforcing and management self-talk, and loneliness is possibly because those factors are being activated by those with a high level of loneliness as a means of self-protection, as both of them help reduce the incidence of invasive thoughts (Sadri Damirchi et al., 2020). Furthermore, results indicated that those with higher levels of loneliness also reported higher inner voice malevolence, consistent with Pugh and colleagues (2018) study which suggested that perceived voice malevolence is associated with loneliness in a manner similar to their association with disordered eating.

This research study has relevance in the intervention and treatment of disordered eating, for those seeking help. Specifically, the results can be used to adapt therapeutic approaches which target voice-hearing experiences, such as Emotion-Focused Therapy, Compassion-Focused Therapy, and Client-Centered Therapy to encompass the difficulties surrounding disordered eating. These efficacious approaches improve the patient's condition by reducing their psychological distress by helping them establish control over their voice-hearing experience (Aya et al., 2019).

In emotion-focused therapy, two-chair intervention or split work is particularly important in targeting self-criticism (Stiegler et al., 2018). With the aim of externalization of inner voices,

and distinguishing primary emotions from secondary ones (Sutherland et al., 2014). During this intervention; clients separate the problematic dialogue from within, place it on an empty chair opposite them, and interact with it. "…..the client is encouraged to give expression to previously suppressed primary emotions—such as hurt and anger experienced in personal stories—and voice unmet needs experienced in relation to critical aspects of the self-represented by the empty chair" (Angus & Kagan, 2013, pp. 525–534). Stiegler and colleagues (2018) found two-chair work to reduce self-criticism in clients.

Parts of compassion-focused therapy (CFT), like emotion-focused therapy, revolve around voice hearing. In CFT, voice-hearers are taught to, "notice their threat-based (dominant-subordinate) motivational systems when they arise", "understand their function in the context of their lives", and "shift into different motivational patterns that are orientated around safeness and compassion" (Heriot-Maitland et al., 2019, p.152). Outcomes of this include reduced shame and self-criticism, and improved self—compassion, self-efficacy, and self-confidence (McManus et al., 2018).

Client-centered clinicians working with inner voices, use reflections to help clients develop meaning bridges between conflicting inner voices present in them. This is done by the clinician reflecting on one voice at a time. This may trigger elaboration on that voice, or stimulate an oppositional response from another voice that wasn't reflected. In this way, clients gain clarity (Dimaggio & Stiles, 2007), and may learn how to control, and facilitate their inner voices.

Another approach, AVATAR therapy, wherein one's inner voice is personified by an animated character that talks, has been proven effective in reducing verbal hallucinations in those with psychosis, as compared to the control group, indicating that it might be a valuable addition in treating disordered eating (Aya et al., 2019).

The importance of targeting self-talk and inner voice activity in those with disordered eating is highlighted in Reichl and colleagues (2013) study which found that those with higher self-talk frequency demonstrated a negative correlation between reported loneliness and mental health, and suggested that they are a risk factor for psychological well-being. Furthermore, Scott and colleagues (2014) study stated that treatment for disordered eating must focus on reducing the inherent power in one's eating disorder voice, and even suggested, "failure of some health professionals to acknowledge the hold of such pro-cognitions is an important factor in increasing treatment-resistance" (p. 14). Some possible aspects of eating disorder self-talk that can be addressed, as identified by qualitatively interviewing those with clinical levels of certain eating disorder symptoms, include "promises (of reduced pain), consolation, self-congratulations (on eating behaviour, etc.), threats, cautions regarding eating, need to purge, need to exercise, self-disappointment (at the inability to meet dietary ideals), self-abuse, self-punishment, self-criticism (lack of self-worth), comparisons (with other), reinterpretations, sensory misconception, denial (of symptoms), moral judgments, ruination of life, weariness (of constantly thinking about food), misery (of living with an eating disorder), lost identity, need for secrecy, rebellion, pride in eating disorder, and fear of life without eating disorder" (Scott et al., 2014, p. 14).

Limitations

This study has several limitations, one of which is its limited sample size of 105 participants, in which the gender division was skewed, 65 females versus 40 males, making it difficult to generalize to larger populations, as well as to make gender-based conclusions. Due to the

unequal division, analyses about differences based on gender were not run. The limited sample size can be attributed to the length of the study, which a participant described as "exhausting", indicating a possibility that the responses may have been biased as a result of self-report. Another participant expressed "Could make the section about weight more broad for people who are on the other end of the spectrum of weight loss", implying that some people who aimed at gaining weight were unable to express themselves in the survey.

An additional limitation is that the research did not filter the participants by presence or absence of an athletic identity and clean eating behaviors, hence the results may be biased due to the overlap between the above-mentioned phenomena and disordered eating. Another limitation of this study is the singular usage of the Self-Talk Scale, which is general in nature. Rather, addition of the exercise self-talk scale and diet self-talk scale would provide us with more information on one's exercise, dieting and eating behaviors (Long, 2017). Furthermore, being a quantitative study, qualitative aspects of inner voices and associations with the same, were overlooked. Moreover, it can be hypothesized that the inclusion of only English speakers in the survey may have generated biased results, as a large sector of the Indian population which only speaks their mother tongue and other non-English languages, couldn't be included in the study.

Future directions

While the specificity of this study to Indian culture addresses a literature gap on the same, comparative analyses to other cultures using a larger sample would produce more concrete results. Also, it would be advisable to use a questionnaire suited to the disordered eating voice, rather than one for general inner voices, in future studies. Furthermore, the usage of screening tools, before employing an assessment tool would be advisable.

Other than the above, future studies can benefit from screening its participants for disordered eating, versus other phenomena wherein similar behaviors are presented, such as clean eating, athletic identity, etc. Furthermore, it would be advisable to look for causal relationships, which could not be studied in this research due to its cross-sectional design. Also, a questionnaire that is more inclusive of body shapes, and associated goals will help in studying a larger representative population. If such a questionnaire is used, it would be advisable to run analyses on males and females separately to generate gender-specific results. Also, categorization of participants based on age, before conducting the analyses can provide valuable information on how symptom severity ranges across different age groups.

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Conflict of Interest

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