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Applying Theoretical Models of Positive Emotion to Improve Pediatric Asthma: A Positive Psychology Approach

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Abstract

Positive emotion, encompassing feelings such as joy and happiness, has been shown to predict a multitude of health outcomes. However, the role of positive emotion in pediatric asthma is not understood. No work to date has examined how positive emotion may offer benefits to children and adolescents with asthma. Based on theory and models of positive emotion and health, we hypothesize that positive emotion may improve asthma outcomes through mediators such as health behaviors and health-relevant physiological functioning. Moreover, boosting positive emotion during times of stress may be particularly relevant in mitigating asthma symptoms. In the present commentary, we elaborate on the hypothesized mechanisms behind such associations grounded within positive emotion theoretical frameworks. Additionally, we summarize the methodologically rigorous work of positive emotion interventions in other clinical settings to propose that positive emotion could be a useful tool in the management of pediatric asthma.

38 **Applying Theoretical Models of Positive Emotion to Improve Pediatric Asthma: A Positive**
39 **Psychology Approach**

40 Asthma can be life-threatening and is associated with a multitude of adverse outcomes,
41 including ongoing symptoms, emergency department visits and hospitalizations, sleep disruption,
42 school absences, and restriction of daily physical activity¹. Additionally, there are numerous
43 other costs associated with this illness, including the financial burden and time (e.g., cleaning the
44 house/environment, medication administration, health care visits), as well as the stress
45 experienced by parental caregivers caused by managing their child's disease². Although
46 guideline-recommended medical care³ has significantly improved the treatment of asthma in
47 children, asthma remains a considerable health concern in this age group.

48 The underlying etiology of asthma and the various mediators and moderators of this
49 disease have been studied for decades⁴⁻⁸, and there is wide agreement that multiple psychosocial
50 factors (i.e., psychological and social variables at the individual [e.g., health literacy, depression,
51 stress] and social [e.g., family discord, poverty] levels) impact asthma symptoms⁷. For example,
52 negative emotions in the family environment, as well as child anxiety and depression, have been
53 associated with increases in the severity of pediatric asthma outcomes^{9,10}. However, more work
54 can be done to test the psychosocial factors that improve outcomes and the management of
55 asthma in children.

56 The relatively new discipline of positive psychology has taken an approach in many
57 disease contexts by which variables that promote health and wellness are the focus¹¹. This view
58 takes the perspective that while it is beneficial to reduce factors that hamper health (e.g., stress,
59 depression), it is also important to promote psychosocial factors and experiences that help
60 individuals flourish and grow. Understanding positive psychosocial factors (e.g., positive

POSITIVE EMOTION AND ASTHMA

61 emotions, social support, self-efficacy) provides researchers and practitioners with novel
62 methods for improving the lives of children suffering from asthma. In this commentary, we
63 review the evidence for why positive emotion may be one psychosocial factor within the
64 framework of positive psychology that can be leveraged to promote better health in children with
65 asthma as the role of positive emotion in asthma is not understood. To do this, we start with a
66 definition of positive emotion and then elaborate on the mechanisms behind possible associations
67 between positive emotion and asthma outcomes. Next, we provide a detailed discussion of
68 positive emotion interventions in other clinical settings and propose that positive emotion
69 interventions may be a particularly useful tool for the management of asthma for children with
70 difficult to treat asthma. Finally, we conclude with a summary of future research that is needed.

71 **Positive Emotion**

72 Positive emotion encompasses feelings such as joy, happiness, calm, excitement, and
73 other emotions that are usually deemed pleasurable¹². This is in contrast to negative emotion that
74 is represented by unpleasant feelings such as anger, sadness, and anxiety. In research, positive
75 emotion (and emotion in general) is most commonly measured through self-report in which
76 participants are asked to indicate to what extent they have experienced different positive
77 emotions.

78 There is a large literature on positive emotion in the context of health (for reviews see¹³⁻
79 ¹⁷). For example, positive emotion has been shown to improve outcomes in health contexts such
80 as cardiovascular disease¹⁸, cancer¹⁹, HIV²⁰⁻²³, and stroke²⁴. In the adult asthma literature,
81 positive emotion has been tied to increases in forced expiratory volume in the first second
82 (FEV₁)²⁵ as well as fewer asthma symptoms²⁶ and a reduced likelihood of respiratory track

83 infections²⁷. However, to date, no work has taken a positive psychology approach by focusing on
84 how positive emotion in children may relate to lung function and asthma symptoms.

85 **Mechanisms of Positive Emotion and Health**

86 To capitalize on positive emotion interventions, it is helpful to understand the
87 mechanisms by which positive emotion impacts health and could influence asthma health
88 outcomes more specifically. Drawing upon models in the field of positive emotion can provide
89 us with such mechanisms. Specifically, the Main Effect Model of Positive Emotion^{13,14,28}
90 demonstrates strong support that positive emotion has health-enhancing effects through its
91 influence on protective health behaviors (e.g., sleep, routine medication use, adherence to self-
92 management behaviors) and health-relevant physiological responses (e.g., better immune
93 functioning, lower stress hormone levels, reduced inflammation, lower blood pressure, lower
94 sympathetic nervous system activity throughout the day). For example, previous literature has
95 shown that higher positive emotion is associated with better health behaviors^{28,29} and health-
96 relevant physiological functioning³⁰. In the context of asthma, health behaviors (e.g., medication
97 adherence³¹, peak flow meter use³², sleep³³, diet³⁴, exercise³⁵) and physiological functioning
98 (e.g., hypothalamic-pituitary-adrenal [HPA] axis activity, sympathetic nervous system [SNS]
99 activity)⁵ are associated with asthma health (e.g., symptoms, airway inflammation and
100 reactivity). Therefore, we predict that in pediatric populations with asthma, positive emotion may
101 potentially improve asthma health through the pathways of health behaviors and physiological
102 functioning (Figure 1 paths a and b).

103 The Broaden and Build Theory of Positive Emotion outlines another way in which
104 positive emotion can be capitalized upon to improve health³⁶. This theory posits that positive
105 emotion has a broadening effect on how people think and behave, which allows individuals to

POSITIVE EMOTION AND ASTHMA

106 overcome automatic responses and instead think and act in flexible ways. This perspective helps
107 to build psychological, physical, and social resources that can be drawn upon to address health
108 issues such as asthma. For example, an adolescent with high levels of positive emotion may be
109 more inclined to regularly take his/her preventive asthma medication (due to improved cognition,
110 good social support). Thus, implementing the Broaden and Build Theory, we predict that other
111 psychosocial factors and physical resources are important components in our model of positive
112 emotion and asthma (see Figure 1). These variables may serve as additional mediators between
113 positive emotion and asthma health outcomes¹. Specifically, positive emotions may impact
114 psychosocial (psychological, social) and physical resources (Figure 1 path c) that may have
115 downstream consequences for health behaviors/physiological function (Figure 1 path d) that are
116 ultimately important for asthma health outcomes (Figure 1 path b). While these psychosocial
117 factors and physical resources may have effects independent of positive emotion, we have
118 included them in Figure 1 to demonstrate how they may come into play with regard to our Main
119 Effect Model of Positive Emotion and Health Applied to Asthma.

120 Stress is one psychosocial factor that is pertinent to consider and elaborate on as both
121 daily and chronic stress have been shown to be associated with increases in asthma exacerbations
122 as well as symptom frequency and severity^{5,37,38}. Stress' impact on asthma health outcomes may
123 be due to its association with poorer health behaviors²⁸ and physiological functioning⁵ that, as
124 mentioned above, are relevant for asthma health outcomes^{5,31,33-35}. Therefore, stress may be
125 negatively impacting asthma health outcomes through its detrimental effect on such health
126 behaviors and physiological functioning. Applying the Stress Buffering Model of Positive
127 Emotion^{13,14} to asthma helps explain and predict when this association could be modified. First,

¹Additionally, these factors may serve as moderators of the association between positive emotion and health behaviors/physiological functioning but for simplicity, we do not show such interaction terms.

POSITIVE EMOTION AND ASTHMA

128 positive emotion may directly impact the negative consequences of stress by reducing stress
129 altogether (Figure 1 path e). Indeed, evidence demonstrates that positive emotion decreases stress
130 directly³⁹. Second, given the known benefits of positive emotion on the health behaviors²⁸ and
131 physiological systems impacted by stress¹⁴, this model predicts that positive emotion may buffer
132 against the negative impacts of stress on health behaviors/physiological functioning and,
133 subsequently, asthma health outcomes. In other words, while stress may have deleterious effects
134 on health behaviors/physiological functioning (Figure 1 path f), positive emotion may dampen
135 those negative effects (Figure 1 path g).

136 **Positive Emotion Interventions**

137 Given the costs associated with ongoing asthma symptoms, understanding positive
138 emotion as an elicitor of improved health may provide avenues for future intervention work that
139 may mitigate these costs. If indeed positive emotion buffers against the negative implications of
140 stress on asthma health outcomes, interventions to boost positive emotion in daily environments
141 may be fruitful. While there are no positive emotion interventions in the area of pediatric asthma
142 that we are aware of, there is a growing body of literature on positive emotion boosting
143 interventions in other health contexts (e.g., ^{20–22,40–42}; see⁴³ for a review). For example,
144 interventions encouraging positive emotions have been utilized in samples of adults with breast
145 cancer⁴⁴, type 2 diabetes⁴², and HIV²¹ as well as in a single study of an adult sample with
146 asthma⁴⁵. These interventions often encompass teaching participants certain skills that are
147 associated with increases in positive emotion²¹. For example, participants are taught to notice
148 and savor positive events, express gratefulness towards others, engage in mindfulness, reappraise
149 negative events in a positive light, value their personal strengths, be kind to others, and use
150 spirituality (as done in ^{21,42,44}). These interventions have been shown to be feasible and

POSITIVE EMOTION AND ASTHMA

151 acceptable in clinical settings and can be delivered in-person, over the phone, and online by
152 trained facilitators.

153 A relatively new body of work on positive emotion interventions for adolescents with
154 type 1 diabetes has come from two research groups⁴⁶⁻⁵¹ (see summaries in Table 1). These
155 groups have adapted interventions based on the adult literature to meet the needs of adolescents.
156 Specifically, Jaser and colleagues' interventions include affirming messages from parents as well
157 as the use of text messages as part of the intervention delivery. Schache and colleagues use easy-
158 to-use gratitude journals. These interventions could be adapted for pediatric patients with asthma
159 and capitalized on to help amplify the beneficial outcomes seen in the already existing cognitive-
160 behavioral stress management programs in the area of pediatric asthma (e.g., ⁵²). Indeed,
161 previous research has shown that positive emotion interventions can increase the effectiveness of
162 health programs (e.g., ²⁰).

163 Several nuances exist in the area of positive psychology interventions. First, it is
164 important to note for those developing interventions in this area that interventions may be more
165 effective in the long-term if they teach skills to promote positive emotions. In contrast,
166 interventions that initiate positive emotions directly (e.g., videos of puppies) may be less
167 effective. This is because direct positive emotion interventions only increase positive emotions in
168 the moment. The proverbial saying "Give a man a fish, and you feed him for a day. Teach a man
169 to fish, and you feed him for a lifetime." is relevant here. By teaching individuals skills that
170 promote positive emotions, they become equipped to continually boost positive emotions
171 regularly in their lives. In other words, these interventions may lead to more instances/greater
172 levels of positive emotion which then have downstream consequences for health
173 behaviors/physiological functioning that could ultimately impact asthma symptoms and lung

POSITIVE EMOTION AND ASTHMA

174 function. Second, positive emotion skills interventions usually take a buffet style approach in
175 which participants are taught a number of different skills (e.g., savoring, reappraisal, goal setting,
176 acts of kindness; e.g.,^{40,42}). This approach has benefits in that it allows the intervention to match
177 the preferences and needs of each individual¹³. However, the drawback is that it is more difficult
178 to assess the unique contribution of each skill on changes in positive emotion and subsequent
179 health/health-relevant outcomes. Thus, more work in this area would benefit by testing the
180 contribution of each skill separately.

181 **Future Research in Positive Emotion and Pediatric Asthma**

182 While a large body of literature has demonstrated the health benefits of positive
183 emotion^{13-18,53}, virtually no research has extended these positive emotion-health models to the
184 area of pediatric asthma. It is important to test these models in this setting. Future basic science
185 work could assess simple associations between positive emotion and asthma over the course of
186 several weeks or months. Studies can investigate the mechanisms behind any associations by
187 assessing whether health behaviors and physiological functioning mediate the positive emotion
188 and asthma relationships. More complex questions remain as to whether positive emotion is most
189 beneficial during times of stress and/or reduces stress that then has downstream implications for
190 asthma-related outcomes.

191 Interventions in this area pose another pertinent area for future research. Interventions as
192 described above, based on the positive emotion conceptual framework and underlying
193 mechanisms, could be adapted and represent an innovative approach to improve the lives of
194 children suffering from asthma. This may be especially important in light of the current
195 coronavirus (COVID-19) pandemic. The pandemic has greatly increased the worry and concern
196 of families with children who have asthma, with some caregivers reporting difficulties in

POSITIVE EMOTION AND ASTHMA

197 obtaining medications and reduced access to care⁵⁴. Additionally, unanswered questions about
198 contraction risk and disease severity of COVID-19 in this population still remain⁵⁵. Taken
199 together, positive emotion interventions may be a timely and theoretically grounded tool for
200 helping to improve the lives of children suffering from asthma.

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