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How Positive and Negative Affect Relate to Postoperative Pain in Children Undergoing Surgery

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How Positive and Negative Affect Relate to Postoperative Pain in Children Undergoing Surgery

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INTRODUCTION

- The relationships between positive and negative affect and health outcomes have been investigated in a variety of conditions (Pressman et al., 2019). Positive affect has been shown to be correlated with lower levels of pain, and negative affect has been correlated with higher levels of pain (Finan et al., 2015; Janssen, 2002).
- Additionally, affect has been shown to be associated with pain postoperatively, in contexts such as knee, spinal, and heart surgery (Seebach et al., 2012). However, these studies primarily consist of adult self-reported pain, while few studies have examined child postoperative pain as it relates to positive and negative affect.
- Recent studies have looked at positive and negative affect particularly along the dimension of arousal (Pressman et al., 2019). For example, positive affect comprises vigor (high arousal), well-being (mid arousal), and calm (low arousal), while negative affect includes mid to high arousal emotions like anger and anxiety, and low arousal emotions like depression.
- Researchers have studied these subconstructs concerning health outcomes, but not specifically in terms of pediatric postoperative pain. We will examine the relationships between these subconstructs and postoperative pain in children to determine if they are differentially related.

METHOD

Participants: 56 patients from the Children's Hospital of Orange County between the ages of 2 and 12 (M_{age} = 5.79, SD_{age} = 2.74); 61% male and 39% female; 56% Hispanic, 31% White, and 13% other

Procedures:

- Parents were recruited for a weeklong longitudinal study and were told they would fill out surveys both preoperatively and postoperatively.
- Parents reported on demographic characteristics before surgery on tablets in the hospital.
- On days 1, 3, and 7 after surgery, parents were emailed a Qualtrics survey link where they reported on their child's pain and state affect.

REFERENCES

Cohen, S., Doyle, W. J., Turner, R. B., Alper, C. M., & Skoner, D. P. (2003). Emotional style and susceptibility to the common cold. *Psychosomatic medicine, 65*(4), 652-657.

Finan, P. H., & Garland, E. L. (2015). The role of positive affect in pain and its treatment. *The Clinical Journal of Pain*, *31*(2), 177–187.

Janssen, S. A. (2002). Negative affect and sensitization to pain. *Scandinavian Journal of Psychology, 43*(2), 131–137.

Petrie, K. J., Pressman, S. D., Pennebaker, J. W., Øverland, S., Tell, G. S., & Sivertsen, B. (2018). Which aspects of positive affect are related to mortality? Results from a general population longitudinal study. *Annals of Behavioral Medicine*, *52*(7), 571–581.

Pressman, S. D., & Cohen, S. (2012). "Positive emotion word use and longevity in famous deceased psychologists": Correction to Pressman and Cohen (2011). *Health Psychology*, *31*(3), 305–305.

Pressman, S. D., Jenkins, B. N., & Moskowitz, J. T. (2019). Positive affect and health: What do we know and where next should we go? *Annual Review of Psychology*, *70*(1), 627–650.

Seebach, C. L., Kirkhart, M., Lating, J. M., Wegener, S. T., Song, Y., Riley, L. H., & Archer, K. R. (2012). Examining the role of positive and negative affect in recovery from spine surgery. *Pain*, *153*(3), 518–525.

Williamson, A., & Hoggart, B. (2005). Pain: A review of three commonly used pain rating scales. *Journal of Clinical Nursing*, *14*(7), 798-804.

Usala, P. D., & Hertzog, C. (1989). Measurement of affective states in adults: Evaluation of an adjective rating scale instrument. *Research on Aging, 11*(4), 403-426.

MEASURES

Pain

Using the Numerical Rating Scale (NRS), parents rated their child's pain from 0 (No Pain) to 10 (Severe Pain) from the prompt, "Please mark the number that shows how much pain or hurt your child has had." The NRS is a reliable and valid measure used extensively in clinical settings (Williamson & Hoggart, 2005).

Affect Subscales

Affect was measured using a modified version of the Profile of Mood States Questionnaire (POMS) developed by Usala and Herzog (1989). The POMS has been used in past studies examining relationships between emotion and health (e.g., Cohen, Doyle, Turner, Alper, & Skoner, 2003; Pressman et al., 2009). The modified measure used in the current study consisted of 18 adjectives (see Table 1) assessing state negative and positive affect, which can be further divided into six subscales (three for both positive and negative). Participants respond to how their child has felt during the past 24 hours using the following intensity rating scale (0 = Not at all; 1 = A little; 2 = Moderately; 3 = Quite a Bit; 4 = Extremely).

Table 1. POMS

POSITIVE AFFECT			
Calm	At ease	Calm	Relaxed
Well-being	Happy	Pleased	Cheerful
Vigor	Full of pep	Energetic	Lively
NEGATIVE AFFECT			
Anger	Hostile	Angry	Resentful
Anxiety	On edge	Nervous	Tense
Depression	Unhappy	Depressed	Sad

Analysis

Primary analyses were performed using linear regression for each subconstruct with pain as the dependent variable. Controls for type of surgery, age, ethnicity, and income were included in the models. Additional analyses including all the positive subconstructs, negative subconstructs, and both the positive and negative subconstructs were conducted to provide a more complete understanding of the relationships among the variables.

RESULTS

- All three positive affect subscales were predictive of lower levels of same-day pain on post-surgery days 1 and 3, but not day 7. Only the depression subscale was predictive of same-day pain at each of the follow-up days (see Table 2: Models 1-6).
- When including all three positive affect subconstructs in one model, calm was predictive on day 7 (see Table 2: Model 7).
- When including all three negative affect subconstructs in one model, depression was predictive of pain on day 1 and anxiety was predictive on day 7 (see Table 2: Model 8).
- When including all six subconstructs in one model, calm and anxiety were predictive of pain on day 7 (see Table 2: Model 9).

RESULTS

Table 2. Regression Coefficients Between Affect Subconstructs and Post-Surgery Pain

		POSITIVE AND NEGATIVE SUBCONSTRUCTS					
Pain	Model	Calm	Well-Being	Vigor	Anger	Anxiety	Depression
Day 1	1	-1.143**					
	2		-1.352**				
	3			-1.08**			
	4				1.358		
	5					0.732	
	6						1.604**
	7	-0.302	-0.713	-0.558			
	8				0.930	-1.170	1.872*
	9	-0.351	-0.217	-0.737	1.099	-1.051	0.822
Pain	Model	Calm	Well-Being	Vigor	Anger	Anxiety	Depression
Day 3	1	-0.728*					
	2		-0.922**				
	3			-0.919**			
	4				0.454		
	5					0.864	
	6						3.132*
	7	0.222	0.016	-0.312			
	8				-0.287	0.122	3.195
	9	0.202	-0.242	-0.794	-0.772	-0.012	2.081
Pain	Model	Calm	Well-Being	Vigor	Anger	Anxiety	Depression
Day 7	1	-0.010					
	2		-0.249				
	3			-0.239			
	4				0.437		
	5					0.729**	
	6						1.047*
	7	0.695*	-0.528	-0.309			
	8				-0.472	0.704*	0.892
	9	0.684*	-0.502	-0.206	-0.394	0.645*	0.749

*$p < .05$, **$p < .01$

CONCLUSION

- As shown in models 1-3 for **positive affect**, calm and well-being were related to less pain in the short-term, but the association faded by day 7. Mean pain intensity decreased by 78% (2.98 to .67) by day 7, suggesting that the influence of positive affect on pain is minimized when pain intensity is low.
- For models 4-6 examining **negative affect** and pain, depression accompanied higher levels of pain, even as pain waned.
- For models 7-9, in which multiple subconstructs were included, the influence of single subconstructs becomes less clear, highlighting the need for diverse and nuanced operationalizations of the positive and negative affect subconstructs.
- Due to the correlative nature of this study, causality cannot be determined; high levels of pain could be the primary factor in altering state affect.