



## The Role of Grit in Health Care Management Skills and Health-related Quality of Life in College Students with Chronic Medical Conditions



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### ARTICLE INFO

#### Article history:

Received 13 December 2018

Revised 27 February 2019

Accepted 27 February 2019

#### Keywords:

Health behavior

Health promotion and prevention

Psychosocial functioning

Quality of life

Resilience

Health care transition

### ABSTRACT

**Purpose:** Adolescents and young adults (AYAs) with chronic medical conditions are at risk for reduced health-related quality of life (HRQoL). Recent research on AYAs without chronic medical conditions found that greater health care management skills were related to higher HRQoL. In addition, grit, an intrapersonal strength, has been linked to greater health care management skills and HRQoL. The current study extended these findings to AYAs with a chronic medical condition.

**Design and methods:** Three hundred and seventy-five undergraduates with a chronic medical condition completed questionnaires, including the short Grit Scale, Transition Readiness Assessment Questionnaire, and RAND 36-Item Short Form Survey.

**Results:** Path analysis revealed a significant direct effect of grit on health care management skills and on both mental and physical HRQoL. Further, health care management skills had a significant indirect effect on the grit → mental HRQoL association, but not on the grit → physical HRQoL association.

**Conclusions:** Higher levels of grit were linked to better health care management skills and better mental and physical HRQoL. Further, grit and mental HRQoL were indirectly linked through health care management skills, suggesting the utility of these skills in improving mental HRQoL.

**Practice implications:** Given the observed benefits of higher grit and health care management skills on emotional HRQoL, and the potential impact of health care management skills on future physical HRQoL, interventions targeting the enhancement of grit and health care management skills may be beneficial in improving the efficacy of transition readiness interventions.

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### Introduction

Medical advancements in recent decades have resulted in significant improvements in the diagnosis and treatment of pediatric chronic medical conditions (CMCs; Compas, Jaser, Dunn, & Rodriguez, 2012; Pai & Schwartz, 2011; Pinzon & Harvey, 2006). As a result, enhanced survival rates have led to larger numbers of adolescents and young adults (AYAs) living longer and planning for the future, including pursuing secondary education (Maslow, Haydon, McRee, Ford, & Halpern, 2011). In 2018, 19.2% and 9.1% of college students reported having been treated by a health professional within the last year for asthma and allergy conditions, respectively (American College Health, 2018).

Additionally, 6.1% of college students reported having a CMC, such as cancer, diabetes, or an autoimmune condition (American College Health, 2018). CMCs often require continued health care management and monitoring, which can place these AYAs at increased risk for adjustment and psychosocial difficulties throughout adulthood (Ferro, Gorter, & Boyle, 2015; Hampel, Rudolph, Stachow, Laß-Lentzsch, & Petermann, 2005; Morkink et al., 2008; Pinquart & Shen, 2011a, 2011b). Given the increasing rates of AYAs in college with a CMC and associated psychosocial risk, it is critical to understand how managing a CMC, in addition to managing the academic and environmental adjustments during the college transition, affects short- and long-term health outcomes (Compas, Wagner, Slavin, & Vannatta, 1986).

For AYAs who attend college, the transition from adolescence to adulthood may be particularly stressful. Such a transition poses unique challenges, which can result in heightened stress associated with increased academic workloads, new personal responsibilities, demanding daily activities, and changing peer and romantic relationships (Brougham, Zail, Mendoza, & Miller, 2009; Compas et al., 1986; Dusselier, Dunn, Wang, Shelley, & Whalen, 2005; Eddington, Mullins, Fedele, Ryan, & Junghans,

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2010). Indeed, even among AYAs without a CMC, these stressors can result in poorer sleep and diet quality, and risky health behaviors, all of which can lead to negative psychological and health outcomes (Hudd et al., 2000; Kandiah, Yake, Jones, & Meyer, 2006; Lund, Reider, Whiting, & Prichard, 2010). Among college students with a CMC, these personal responsibilities and stressors are compounded by the self-management tasks associated with their medical condition (Devins, 2010; Ferro et al., 2015). In addition, AYAs with CMCs often must connect with new local providers for routine visits, medication management, and illness monitoring, all in addition to the unique challenges of navigating college.

Not surprisingly, given the presence of both college- and illness-related stressors, AYAs with CMCs who attend college are at risk for poorer physical and mental health-related quality of life (HRQoL) and report increased social isolation (Herts, Wallis, & Maslow, 2014). Further, college students with CMCs report poorer overall psychological adjustment, as compared to their peers without a CMC (Herts et al., 2014; Sharkey et al., 2018). Thus, there is a clear need to identify factors that relate to greater psychosocial functioning and HRQoL among AYAs with CMCs. Several areas for intervention have been suggested to improve HRQoL among AYAs with CMCs, including the promotion of health care management skills during the transition to adulthood, defined as *transition readiness* (Betz, 2017, 2018; Reed-Knight, Blount, & Gilleland, 2014; Sansom-Daly, Peate, Wakefield, Bryant, & Cohn, 2012). Interestingly, recent research on AYAs without CMCs found that greater health care management skills were associated with higher self-reported HRQoL (Sharkey et al., 2017). As such, it is important to examine health care management skills as they relate to HRQoL among AYAs with CMCs, who require additional self-management responsibilities.

Unfortunately, there is little research on factors that are associated with positive health care management skills and HRQoL among AYAs with CMCs. The existing literature has identified several individual factors, such as self-efficacy, knowledge, developmental competencies, and attitudes/beliefs to be relevant to transition readiness (Betz & Redcay, 2002; Gray, Schaefer, Resmini-Rawlinson, & Wagoner, 2018). However, less is known about how individual factors that are associated with greater health care management skills relate to quality of life, and psychosocial and physical outcomes. Notably, Sharkey et al.' (2017) study of healthy AYAs in college found not only did increased transition readiness relate to increased HRQoL, but also grit, an intrapersonal trait often studied within the positive psychology literature, was associated with increased transition readiness and subsequent HRQoL (Duckworth, Peterson, Matthews, & Kelly, 2007). Grit is differentiated from other positive constructs, such as conscientiousness, perseverance, and self-control, as it centers on the long-term and incorporates the element of "passion" or a committed interest in achieving superordinate goals, irrespective of the specific goal (Duckworth et al., 2007). Thus, for AYAs with CMCs who must engage in daily health care management behaviors to maintain their long-term health and HRQoL, grit may be an important source of resiliency to consider.

According to Aspinwall and Pengchit's (2013) model of positive phenomena and health, positive psychology factors promote health behaviors and subsequent health outcomes via five cooperating pathways, involving biological, cognitive and emotional, coping, social, and behavioral mechanisms. Consistent with this model, health care management skills may serve as a behavioral mechanism by which grit impacts health outcomes. Similar to the concept of self-control, which suggests that individuals prioritize efforts toward specific goals over immediate gratification and reward, grit has been shown to be related to achievement of even longer-term objectives, which may take years to accomplish (Duckworth et al., 2007; Monaghan, Clary, Stern, Hilliard, & Streisand, 2015). Therefore, among those with CMCs, individuals with high levels of grit may better prioritize and pursue transition readiness skills as a mechanism for long-term medical management.

To this aim, the present study sought to expand the findings of Sharkey et al. (2017) by examining the relationship between grit, health

care management skills, and HRQoL among college students with a CMC. It was anticipated that: 1) greater grit would be associated with greater physical and mental HRQoL and transition readiness in college students with a CMC, 2) that greater transition readiness would be associated with greater mental and physical HRQoL, and 3) the relationships between grit and mental and physical HRQoL would be mediated by transition readiness. Further, given the observed direct effects of grit on HRQoL observed in Sharkey et al. (2017), both direct and indirect effects of grit on mental and physical HRQoL were expected.

## Methods

Participants were 392 college students with a CMC enrolled in various undergraduate psychology courses at a large Midwestern university as part of an ongoing larger online study of college student health (Sharkey et al., 2017). Participants were between 18- and 24-years-of-age ( $M_{age} = 19.69$  years,  $SD = 1.44$ ) and self-reported having a CMC (e.g. allergies, asthma, inflammatory bowel disease). Prior to beginning the study, participants consented to participating in the study via an online consent form. The survey was conducted as a cross-sectional, one-time study, and all measures were completed through an online portal. After completion of the study, the participants received class credit as compensation for a portion of the course requirement. The study procedures adhered to the university Institutional Review Board and the American Psychological Association ethical guidelines.

## Measures

### Demographics

Demographic information, including age, sex, ethnicity, and education, were obtained via self-report. Further, the number, type, and age of diagnosis of CMCs were collected via participant self-report and are noted in Table 1. Due to the small number of ethnic minorities included in the sample, race was dichotomized to Caucasian and Other for all analyses. Education level was dichotomized to underclassmen (freshmen and sophomores) and upperclassmen (juniors and seniors).

**Table 1**  
Demographics ( $N = 392$ ).

Characteristic	N	%
Sex		
Female	303	77.3%
Ethnicity		
Caucasian	307	78.3%
Non-Caucasian	85	21.7%
Education		
Underclassmen	193	48.2%
Upperclassmen	199	50.8%
Disease		
Asthma	180	45.9%
Type I diabetes	23	5.9%
Type II diabetes	2	0.5%
Sickle cell disease	1	0.3%
Cystic fibrosis	1	0.3%
Obesity	12	3.1%
Fibromyalgia	5	1.3%
Juvenile Rheumatic Disease (JRD)	12	3.1%
Allergies	132	33.7%
Cancer	6	1.5%
Disorders of Sexual Development (DSD)	3	0.8%
Inflammatory bowel disease	12	3.1%
Irritable bowel syndrome	53	13.5%
Celiac disease	17	4.3%
Epilepsy	10	2.6%
Other	173	44.1%
	M	SD
Age	19.69	1.44

Note.  $M$  = mean,  $SD$  = standard deviation,  $N$  = number of participants.

### Short Grit Scale

The Short Grit Scale is an 8-item self-report questionnaire used to assess one's perseverance, ability to maintain interest, and persistence in pursuing long-term goals (Duckworth & Quinn, 2009). Participants rated the extent to which they agree with each item on a 5-point Likert scale (1 = *Not like me at all* to 5 = *Very much like me*). An example item is "*I am diligent.*" The measure is scored by averaging all items, resulting in a grit score ranging from 1 to 5. Higher scores demonstrate greater levels of grit. The Short Grit Scale has demonstrated good internal reliability, test-retest reliability, and criterion reliability in previous studies of adolescents and young adults (Duckworth & Quinn, 2009; Sharkey et al., 2017). In the current study, reliability was good ( $\alpha = 0.81$ ).

### Transition Readiness Assessment Questionnaire

The Transition Readiness Assessment Questionnaire (TRAQ; Sawicki, Lukens-Bull, Yin, Demars, Huang, Livingood, et al., 2011) is a 20-item self-report questionnaire that measures skills to manage one's CMC and associated readiness to transition from pediatric to adult health care providers. The items are composed of questions assessing various non-illness specific skills for managing a CMC, such as managing medications, talking with providers, and keeping appointments, with the assumption that these skills relate to one's ability to successfully transition to adult health care. An example item is "*Do you take medications correctly and on your own?*" Participants endorsed their current ability or skill level for each item on a Likert scale (1 = *No, I do not know how to* to 5 = *Yes, I always do this when I need to*), with higher scores indicating greater health care management skills. The TRAQ has demonstrated good validity and reliability in past studies (Wood, Sawicki, Miller, Smotherman, Lukens-Bull, and Livingood, et al., 2014), consistent with reliability in the current study ( $\alpha = 0.81$ ).

### RAND 36-Item Short Form Survey

The RAND 36-Item Short Form Survey (SF-36; Hays, Sherbourne, & Mazel, 1993) is a 36-item self-report questionnaire measuring physical and emotional HRQoL, and status of overall general health. The SF-36 consists of 8 domains: physical functioning, role limitation owing to physical health, role limitation owing to emotional problems, energy/fatigue (vitality), emotional well-being, social functioning, pain, and general health. The domains are combined into mental health composite (MHC) and physical health composite (PHC) scores. An example item is "*How much time, during the past four weeks, did you feel worn out?*" Higher scores on the SF-36 indicate better HRQoL. Good validity and internal consistency of the SF-36 has been demonstrated in previous studies (Bunevicius, 2017; McHorney, Ware, & Raczek, 1993), as well as in the current study ( $\alpha = 0.81$ ).

### Overview of analyses

Bivariate correlations were initially conducted to assess the relationships between variables of interest. Path analysis, a specific type of structural equation modeling, was used to assess the mediation model. Path analysis allows for testing of multiple directional paths within a singular model, based on a priori hypotheses about the interrelationships between the variables included. Additionally, path analysis allows for testing both the direct paths between two variables, but also the indirect path from an independent variable to an outcome variable through a mediating variable. In the present study, both direct and indirect effects were evaluated to understand the mediational process. Mplus Version 7.4 was used to test the mediation model, with full information maximum likelihood used to handle missing data (Enders, 2010). Grit was entered as an independent variable, transition readiness was entered as the mediator, and both mental and physical HRQoL were entered as dependent variables. Demographic variables were estimated on all endogenous variables. Due to theoretically-driven hypotheses, both the direct and indirect effects of grit were estimated on both mental and physical HRQoL, resulting in a fully-saturated model with arbitrarily perfect model fit. Thus, model fit statistics cannot be interpreted. Indirect

paths were evaluated using  $p < .05$  as an indicator of significance. The model was bootstrapped to 5000 samples. Underlying assumptions made by the model include normality of data, such that there is not significant skew or kurtosis of the data, though bootstrapping can be used to accommodate datasets which have significant skew or kurtosis. In addition, the model assumes that there is not significant multicollinearity. According to Bentler and Chou (1987), at least 5–10 cases is suggested per parameter. Thus, the present study required between 150 and 300 participants to be fully powered to detect an effect.

## Results

The majority of the subjects were Caucasian (78.3%) and female (77.3%). The subjects were nearly evenly split between underclassmen (49.2%) and upperclassmen (50.8%). The subjects had a mean age of 19.69 years ( $SD = 1.44$ ) and reported a variety of CMCs, with asthma (45.9%) and allergies (33.7%) as the most commonly reported conditions. Descriptive statistics demonstrated that on average HRQoL was considered moderate, with mental health ( $M = 38.53$ ,  $SD = 13.07$ ) rated lower than physical health ( $M = 45.61$ ,  $SD = 9.75$ ). Grit in this population was also generally comparable to other college age groups ( $M = 3.29$ ,  $SD = 0.66$ ), and health care management skills were generally moderate-to-high ( $M = 3.95$ ,  $SD = 0.72$ ) (Duckworth et al., 2007). Analysis of skewness and kurtosis fell within the acceptable range ( $\pm 2.0$ ) for the Short Grit Scale, TRAQ, SF-36 Physical Health Composite, and SF-36 Mental Health Composite measures (Cameron, 2004). The variance inflation factor ( $VIF = 0.705$ ) was calculated to test for multicollinearity between the dependent variables, and fell within normal limits, suggesting that multicollinearity is not an issue with these data.

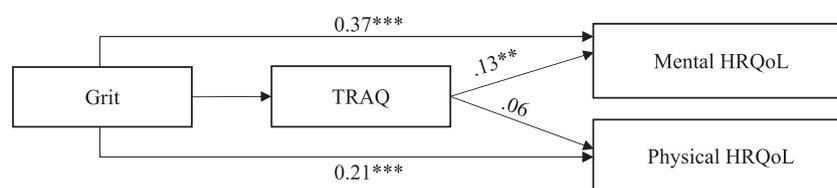
### Preliminary analyses

Bivariate correlations indicated that grit was associated with health care management skills ( $r = 0.295$ ,  $p < .001$ ), as well as the two main outcomes: physical health composite (PHC;  $r = 0.209$ ,  $p < .001$ ) and mental health composite (MHC;  $r = 0.398$ ,  $p < .001$ ). Several covariates were also identified, including age, sex, and education level. Specifically, age was related to health care management skills ( $p < .01$ ), sex was correlated with health care management skills ( $p < .01$ ), and PHC ( $p < .001$ ), and education level was associated with health care management skills ( $p < .001$ ). These covariates were included in subsequent analyses.

### Path analysis

The a priori hypothesized model is shown in Fig. 1. A fully saturated model was estimated, resulting in arbitrarily perfect fit ( $\chi^2(22) = 0.00$ ,  $p < .001$ ; CFI = 1.00; TLI = 1.00; SRMR = 0.00; RMSEA = 0.00). The final model indicated that grit had a significant direct effect on MHC ( $\beta = 0.37$ ,  $SE = 0.05$ , 95% CI [0.28, 0.46]) and PHC ( $\beta = 0.21$ ,  $SE = 0.06$ , 95% CI [0.10, 0.32]), such that higher grit was associated with greater mental and physical HRQoL. Grit also had a significant direct effect on health care management skills ( $\beta = 0.29$ ,  $SE = 0.05$ , 95% CI [0.20, 0.38]), such that higher grit was related to greater health care management skills. Health care management skills had a significant direct effect on MHC ( $\beta = 0.13$ ,  $SE = 0.05$ , 95% CI [0.03, 0.22]), but not PHC ( $\beta = 0.06$ ,  $SE = 0.06$ , 95% CI [−0.06, 0.18]).

Mediated path results indicated that grit had a significant indirect effect on MHC through health care management skills ( $\beta = 0.04$ ,  $SE = 0.02$ , 95% CI [0.01, 0.07]). However, the indirect effect of grit on PHC through health care management skills was not significant ( $\beta = 0.02$ ,  $SE = 0.02$ , 95% CI [−0.02, 0.05]). These results suggest that the relationship between grit and mental HRQoL is partially accounted for by health care management skills, but the relationship between grit and physical HRQoL is not accounted for by these skills.



**Fig. 1.** Path analysis model. Note. TRAQ = Transition Readiness Assessment Questionnaire. HRQoL = Health-related quality of life. Demographic variables (i.e., age, sex, ethnicity, education level) were controlled for in the models, but are not depicted. \*\* =  $p < .01$ , \*\*\* =  $p < .001$ .

## Discussion

The present study evaluated the relationship between grit, a positive psychology phenomenon, health care management skills, and quality of life in AYAs with CMCs. These analyses extend the findings of Sharkey et al.' (2017) study, which found health care management skills to mediate the relationship between grit and HRQoL in AYAs without a CMC. The present analyses examined the same mediation model among college student AYAs with a CMC, assessing the role of grit and health care management skills in relation to HRQoL. Hypotheses were generally supported, such that AYAs with higher levels of self-reported grit had higher levels of health care management skills and greater mental and physical HRQoL. Mediation analyses revealed both direct and indirect relationships between grit and mental HRQoL, with health care management skills partially mediating the relationship between grit and mental HRQoL. However, health care management skills were not associated with physical HRQoL.

According to Aspinwall and Pengchit's (2013) model, positive phenomenon may influence health outcomes through various pathways, including health behaviors. Thus, aligned with this model, the current results provide support for the relationship between grit, a positive phenomenon, and HRQoL through the health behaviors that define transition readiness. Interestingly, among this sample of AYAs, this model was only supported for mental HRQoL, and not physical HRQoL. The reasons for this finding are unclear. Although speculative, it may be that a lack of health care management skills is not yet associated with physical health among these young individuals. It may be that those individuals with low transition readiness may still have more involved caregivers helping to manage their condition, or simply have not yet incurred negative physical effects related to poor self-management. However, it remains quite possible that deficits in health care management skills during this transitional period may translate into more long-term health outcomes which are not yet evident.

Although the hypothesis that grit would indirectly relate to physical HRQoL was not supported, it may be that there are long-term HRQoL consequences associated with poor transition readiness. In fact, there is a specific focus in the literature on health care management skills during the transitional period between adolescence and adulthood, as this is a critical time in which responsibility of care transitions to the AYA, and when AYAs transition from pediatric to adult health care providers. It is believed that transition readiness, or health care management skills, during the transitional period, may bear directly on health outcomes, either through short-term or long-term health outcomes (Schwartz, Tuchman, Hobbie, & Ginsberg, 2011). Thus, the importance of evaluating these health care management skills throughout the transitional period, and contributors to these skills, remains highly relevant. The interdisciplinary team, including primary care nurses and nurse case managers, may play a critical role in evaluating these skills, identifying strengths and assets that contribute toward effective transition (Betz, Redcay, & Tan, 2003).

Interestingly, similar to Sharkey et al.' (2017) investigation of this model within AYAs without CMCs, there were both direct and indirect effects of grit on HRQoL. According to Aspinwall and Pengchit's (2013) model, there are five distinct pathways by which grit may impact health outcomes. Thus, there are likely many other active processes occurring

by which AYAs with CMCs, who are grittier, experience better health outcomes. For instance, AYAs with higher levels of grit may have better coping mechanisms, greater social resources, and reduced stress-reactivity that may contribute to HRQoL above and beyond the health care management skills which make up transition readiness. Further, given the multitude of stressors impacting AYAs with CMCs who attend college, there may be many avenues by which grit may serve as a protective factor against negative health and adjustment outcomes (Brougham et al., 2009; Compas et al., 1986; Dusselier et al., 2005; Eddington et al., 2010).

Given the apparent protective relationship between grit and mental HRQoL, this construct may certainly be an important area for intervention when developing transition readiness interventions. A recent call was made for the development of novel, tailored intervention programs to address transition readiness (American Academy of Pediatrics et al., 2011; Sharma, O'Hare, Antonelli, & Sawicki, 2014). Additionally, there has been a recent focus on identifying intrapersonal strengths, such as grit, to target in these interventions (Crowley, Wolfe, Lock, & McKee, 2011). These collective findings imply that college students with CMCs who have high levels of grit may be better equipped for health care transition, as they demonstrate increased health care management skills. Further, the exhaustive literature on grit has demonstrated that AYAs with greater levels of grit also go on to achieve more long-term success (e.g., high school, college, and graduate school Grade Point Average), life satisfaction, and psychological well-being (Cross, 2014; Duckworth et al., 2007; Vainio & Daukantaitė, 2016). Thus, targeting grit as a part of transition readiness interventions may not only have positive effects for health-related transition, but may also support AYAs' overall adjustment during the transition from adolescence to adulthood. Nurses are clearly in a unique position to help develop and deliver such targeted interventions, whether it be in university health centers or in community health clinics that serve the university population. Indeed, nurses are already integrally involved in transition planning in the vast majority of health settings, helping youth with special health care needs (Betz, 2004), thus well situating themselves to be interventionists.

However, it is important to note that these implications are speculative, given the limited research regarding the relationship between grit and physical health outcomes, and the current lack of interventions targeting grit (Graham Thomas, Seiden, Koffarnus, Bickel, & Wing, 2015; Reed, Pritschet, & Cutton, 2013). Preliminary research indicates that grit has been shown to relate to lower body mass index and improved exercise behaviors among adults, but these findings have not been replicated among AYAs or in relation to other important health behaviors or illness-specific outcomes (Graham Thomas et al., 2015; Reed et al., 2013). Further, it has been suggested, but not demonstrated, that cognitive-behavioral techniques that increase expectancies for success and distress tolerance, and values-based strategies that support an individual's efforts to engage in actions that center on their goals may result in the development of grit and positive outcomes (Eskreis-Winkler, Gross, & Duckworth, 2016; Sharkey et al., 2017). Therefore, future research is needed to better understand the relationship between grit and a variety of health behaviors and outcomes, with the eventual aim to design interventions that target grit-related behaviors and an effort to improve AYA transition and health.

Although the present study has a number of strengths, including the large sample size and the heterogeneity of CMCs represented in the sample, the findings should be interpreted in light of several limitations. First, these are cross-sectional data based on all self-report measures, and as such, causal inferences cannot be made and shared-method variance remains a concern. Future research should aim to address these limitations through longitudinal methodology to better understand the temporal and causal links between grit, transition readiness, and health outcomes. In addition, studies with long-term outcome data would be valuable in order to assess the implications of poorer health care management skills in later adulthood. Owing to the lack of ethnic diversity in the present sample, the present findings should be replicated in a more diverse group of AYAs, and it may be beneficial to expand the present findings to all AYAs with CMCs, not just those who attend college. Despite these limitations, the present findings shed light on the important role that grit may play in the promotion of transition readiness skills, as well as HRQoL. In addition, these analyses further highlight the need to assess long-term implications of transition readiness skills because reduced HRQoL associated with poor self-management skills may not be particularly prominent until later into adulthood.

## Funding

We have no funding to report.

## CRedit authorship contribution statement

**Katherine A. Traino:** Conceptualization, Writing - original draft. **Dana M. Bakula:** Conceptualization, Writing - original draft, Methodology. **Christina M. Sharkey:** Conceptualization, Writing - original draft, Formal analysis, Methodology. **Caroline M. Roberts:** Writing - original draft. **Nicole M. Ruppe:** Writing - review & editing, Visualization. **John M. Chaney:** Supervision, Writing - review & editing. **Larry L. Mullins:** Supervision, Writing - review & editing.

## Acknowledgements

We would like to acknowledge the Vaughn O. Vennerberg Endowment Fund for supporting this project.

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