

Bullying, Loneliness, and Future Responses to Stressors

by

Magen Haneline

A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Science

Approved April 2013 by the
Graduate Supervisory Committee:

Matt Newman, Chair
Jessica Salerno
Paul Miller

ARIZONA STATE UNIVERSITY

May 2013

ABSTRACT

Bully victimization has been associated with blunted cardiovascular responses to stress as well as elevated responses to stress. The difference between these altered physiological responses to stress is largely unknown. This study explored several possible moderators to the relationship between chronic stress and future cardiac output (an indicator of increased stress) in response to future stressors. These moderators include the difference between social and physical stressors and individual levels of loneliness. Participants were administered measures of loneliness and victimization history, and led to anticipate either a "social" (recorded speech) or "non-social" (pain tolerance test) stressor, neither of which occurred. EKG and impedance cardiography were measured throughout the session. When anticipating both stressors, loneliness and victimization were associated with increased CO. A regression revealed a three-way interaction, with change in cardiac output depending on victimization history, loneliness, and condition in the physical stressor condition. Loneliness magnified the CO output levels of non-bullied individuals when facing a physical stressor. These results suggest that non- bullied participants high in loneliness are more stressed out when facing stressors, particularly stressors that are physically threatening in nature.

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INTRODUCTION

Bullying as a Chronic Stressor

Bullying is a specific type of stressor that fits three widely accepted standards. The bullying behavior must be intended to harm, the aggressor must be more powerful than the victim either physically or psychologically, and the bullying behavior must be a repeated act over time (Olweus, 1994). These qualities are what make bullying an ideal stressor to study in regards to chronic stress. Its repetitive and inescapable nature during an important time in emotional development makes it a stressor particularly relevant when studying chronic stress in adolescence.

While bullying is always an act of aggression, it is displayed differently in male than in female students. According to a study by Rivers and Smith (1994), males have been shown to engage in direct acts of physical aggression more often than females. Females are less likely to engage in physical aggression as a bullying tactic. Instead, female students often engage in behaviors that indirectly harm their intended victim and often avoid taking credit for the bullying. This indirect aggression can be intended to lower a person's status by harming one's reputation or lowering their self-esteem. It often isolates the intended victim and thereby exposes them to a powerful, chronic stressor among their peers.

This chronic exposure to social stress could have long term consequences for an individual's future responses to stress, particularly social stressors. In many cases, social stressors do not stay at school, but follow a student into every aspect of their lives. While research examining the long term consequences of bullying as a chronic stressor is

relatively scarce, Newman, Holden & Delville (2005) reported that experiences with bullying had a direct, positive relationship with self-reported perceptions of stress. The duration of time one was bullied also had a positive relationship with perceptions of stress, suggesting that the more “chronic” a stressor may be, the more damaging effects it has the potential to create.

Studies examining the long term effects of chronic stress on physiological responses to stress have mixed results. In some cases, participants showed blunted cardiovascular responses to stressors much like one sees in those with post-traumatic stress disorder. However, other participants showed increased physiological distress when faced with an acute stressor (Gump&Matthews, 1999). In one application of this concept to bullying, Hamilton, Newman, Delville, & Delville (2008) observed blunted blood pressure responses to acute stress among victims of bullying.

The results of these studies suggest that bullying has an impact on future physiological responses to stress, but also that determining the directional relationship between these two variables is complicated. Bully victims do not react the same way to the stressors they experience. Exploration of potential moderators is necessary to better understand this relationship.

Adding to this complicated picture is the differences in bullying behaviors one can experience. There are also differences in the type of bullying one experienced during high school, suggesting that different types of chronic stressors could result in different variations in stress patterns later in life. Physical aggression was reported more frequently in grade-school children than in high school students for both sexes. Additionally, both

male and females reported high frequencies of relational aggression in high school in comparison to physical bullying (Whitney & Smith, 1993).

To this date, no work has been done to explore the possible interactive nature of the type of chronic stressor one experiences and the type of stressor one is exposed to later in life. Research exploring the relationship between physical and social stressors is non-existent in literature pertaining to humans. This pathway needs to be further explored to better understand the specific nature of long term stress responses in bullied individuals.

In the present study, I attempted to determine moderators between bully victimization and future responses to stress. The fact that victims of bullying do not respond in the same way to their victimization, and do not all have the same long term consequences leads to the question, “What causes victims to respond in different ways to bullying?” This study attempts to better understand this question by exploring potential moderators between bully victimization and cardiac output, a physiological marker indicating stress levels.

LITERATURE REVIEW

Chronic Stress/Animal Models

The majority of research done in regards to the long term effects of chronic stress have mostly been limited to animal models. Chronic stress causes a variety of effects in mammals, including disturbances in both physical and mental health (Kim et al., 2007; McEwen, 2003; Nestler et al., 2002; Swaab et al., 2005).

In animal models, experiences with social stress can result in a generalized fear of future stressors. Rats who are bullied in adolescence avoid future interactions with other rats, are more likely to display submissive behavior in a confrontation, and they show increased physiological responses to new situations and stressful encounters (Katz et al., 1981; Zelena et al., 1999.). These results suggest that early experiences with chronic stress can permanently change the way a rat responds to future stressors, both social and physical in nature. Rats were unable to regulate their response to future social stressors, as well as when in a non-social environmental stressor (Katz et al., 1981; Zelena et al., 1999).

Rats are not the only animals that exhibit changes in stress response in reaction to chronic stress. Golden hamsters that endure chronic stress in adolescence show an inhibition of aggression towards hamsters of the same size and an avoidance of larger adult hamsters (Delville et al., 1998). A recent study by Bastida, Puga, & Delville (2008) implies that chronic stress in hamster adolescence will result in future increased stress and avoidance of *socially* stressful situations. Hamsters were able to regulate their stress response to a new environment, but unable to regulate their stress response when placed in a social stressor situation (In these cases, exposure to a larger, male hamster served as a social stressor). Interestingly, in hamsters, this increased stress response is limited only to those stressful events with a social component , and not a physical stressor (Bastida et al, 2008).

The research of Bastida et al. (2008) implies a need to explore the interaction between the type of chronic stress one experiences, and the type of stressor one is

confronted with later in life when measuring physiological stress responses. There are a variety of types of stressors in the world: Sweltering hot temperatures, defending your thesis, and dealing with the constant stress of money or health issues. Perhaps the type of chronic stressor one experienced as an adolescent is another potential moderator between bully victimization and future stress responses. Because stress management is so relevant to human health, it is imperative to better understand this interaction.

Chronic Stress/Human Models

In a review of 19 studies, Gump and Matthews (1999) reported that chronically stressed participants have altered levels of reactivity to episodes of acute stress. The results of this research were mixed in regards to what direction normal physiological responses changed in response to stressors. In some cases, participants showed blunted cardiovascular responses to stressors much like one sees in those with post-traumatic stress disorder. Other participants showed increased physiological distress when faced with a stressor. While there are several theories surrounding these differences, no studies have directly explored the differences in individuals with altered responses to stress.

In a study conducted by Hamilton, Newman, Delville, & Delville (2008), bullied males had blunted systolic blood pressure in response to stressors. This is similar to the effect we see in individuals with post-traumatic stress disorder. Bullied females, however, were better able to regulate their stress response and showed *higher* blood pressure in response to the stressor. This study suggests that females are better able to regulate their blood pressure when facing a stressor, but the literature in this regard is mixed. It is

unclear which victims of bullying have blunted physiological responses to stressors, and which bully victims show heightened physiological responses to future stressors.

The difference in victim response suggests a moderator at work between experiences with bullying and future responses to stress. One of the moderators explored was feelings of loneliness and perceived social support before anticipating the stressor. By taking our Loneliness measurement at a date long after the bullying experience, we were able to determine whether or not experiences with bullying and *long term* feelings of loneliness were correlated.

Loneliness and Social Support

The previous research discussed suggests that not everyone responds in the same way to bully victimization. Social support has been shown to have many health and emotional benefits to individuals experiencing major and minor stressors (Rigby, 2011).

During stressful situations, feelings of loneliness can increase and mediate responses to stress. Cacioppo, Hughes, Waite, Hawkley, & Thisted, (2006) reported that those who report feelings of isolation and feel as though they have no social support system to turn to in times of stress, are more likely to be diagnosed with depression and suffer from other negative physical and psychological symptoms in response to the stressor. Rigby's study reported that loneliness was associated with more depressive symptoms, levels of inter personal hostility and perceived stress (2010). Rigby describes loneliness as one of the reasons for many health problems, and a risk factor for depression. Social support, however, has been shown to buffer these effects in many cases of stress.

More recent literature also supports the idea that individuals who feel as though they have a large support network will not have the same response to acute, every day stressors as those who feel lonely and isolated. Gaudin, Wodarski, Arkinson, & Avery, (1990) found that in families with low Socio-economic status, feelings of loneliness were correlated with life stressors and informal measures of social support in families who were neglectful of their dependent children.

These feelings of loneliness were not correlated with actual measures of social support measured by a social worker, suggesting that feelings of loneliness are generated by one's belief that social support exists than on actual measures of social support (Gaudin et al, 1990). Parents in low socio-economic conditions who did not neglect their children reported lower feelings of loneliness, and higher measures of social support. The actual measured social support between these groups did not differ, suggesting that the feelings of loneliness in stressful circumstances have an impact on behavior more than actual, enacted social support. This research also demonstrates that there is a difference between loneliness, ones perceived social support, and actual measures of enacted support in one's life. An individual with many friends and family can feel as though they are lonely.

Bullying is a stressor that is isolating in nature due to the fact that it is directed at one individual, typically weak and lower in status than the aggressor. Individuals do not always show the same, isolating response to being bullied, and individuals react to being bullied in many different ways. Research by Gaudin et al. (2010) and Cacioppo, (2006)

suggest that feelings of loneliness and enacted social support could be the reason for these differences in altered stress response among victims of chronic stress.

Strengthening this hypothesis, evidence has emerged that feelings of social support can result in an increase in positive coping strategies among bully victims (Newman et al., 2005). Bully victims with a strong sense of support do not experience as many of the long term consequences as isolated bully victims.

Bully victims have differing perceptions of social support after their experiences with bullying. This study, along with previous research on the topic, has not found a direct correlation between bully victimization and perceptions of social support. This suggests that there are differences in bully victims and the way they perceive the social support available to them after their victimization. Bully intervention programs suggest the use of social support systems to increase bully victim's coping skills in regard to bullying (Rigby, 2011). By decreasing feelings of loneliness, social support provides a buffer against the negative consequences of being bullied.

PRESENT STUDY

There were two primary aims to this study. The first was to better understand the differences in cardiac output in response to stress after experiencing bullying by exploring the moderating factors of loneliness and type of stressor. Cardiac output is a measurement of sympathetic activity. By collecting this measurement as a dependent variable, we can determine how much stress a participant is feeling.

The second question this study attempted to answer was whether or not experiencing social or physical bullying in adolescence would have an interaction with the type of stressor that participants deal with in the future.

In a study conducted by Newman et al (2005), experiences with bullying, as well as the duration of bullying, were associated with elevated self-reported perceptions of stress. There is mixed literature concerning the relationship between bullying and future physiological responses. In some literature, participants showed blunted blood pressure as well as superior blood pressure regulation in response to stressors (Hamilton et al, 2008). It is unclear what causes these differences in responses.

Our main purpose in this study was to better understand the relationship between these differences, and whether or not the type of stressor one is encountering, or individual feelings of loneliness, could moderate the relationship between experiences with bullying and future physiological responses to stress.

Primary Research Questions

Understanding the relationship between experiences with bullying and physiological responses to both social and physical stressors.

Hypothesis 1: It was hypothesized that any type of experience with bullying, whether social or physical, would result in an increased stress response in both the physical and social stressor condition. This hypothesis was made because previous findings of elevated perceptions of stress in bullied participants did not differentiate between social and physical stressors (Newman et al, 2005).

Understanding the moderating effect of loneliness on bully victimization and future physiological responses to stressors.

Hypothesis 2: It was also hypothesized that feelings of loneliness would have a direct, positive relationship with physiological responses to stressors. We also predicted that loneliness could have a moderating effect. Previous researcher has shown that feelings of social support have buffering effects in regards to physical and psychological responses to stressful situations (Cacioppo, 2006).

Loneliness is considered the perception of social support, and does not necessarily correlate with actual measures of social support (Cacioppo, 2006). It was hypothesized that individual levels of loneliness could explain the differences in physiological responses to stress among bully victims. Perhaps some bully victims feel as though they have a strong social support system and therefore are buffered from the high physiological stress responses other bully victims feel when facing a stressor. This hypothesis is supported in studies conducted by Newman et al. (2005).

Exploring a possible interaction between the type of stressor one encounters as an adolescent (physical or social) and the stress condition they were assigned to (physical or social).

Hypothesis 3: This research was exploratory in nature. We hypothesized that there would be an interaction between the two types of stressors. This prediction was mostly based on animal research demonstrating that chronic stress caused long term disturbances in future coping responses to stress (McEwen, 1998; Nestler et al.,2002; Swaab et al., 2005). These results are particularly evident when studying social stressors. Rats who are

bullied in adolescence avoid future interactions with other rats, are more likely to display submissive behavior in a confrontation (Katz et al., 1981; Zelena et al., 1999.). While these behaviors appear to be generalized to all future stressors in rats, hamsters show a particular avoidance of *social* stressors after experiencing chronic social stress (Bastida et al., 2008). These results suggest an effect particularly strong when examining social stressors.

METHOD

Participants

Participants (n=114) were ASU undergraduate students recruited using Arizona State University's SONA participant pool system. Participants were given 2 SONA credits required for the completion of undergraduate psychology courses in return for their participation in the study. Due to an oversight, we did not collect demographic information from participants.

During the analysis of data, two participants were dropped from the experiment after reading the research assistant's notes. We pool participants mainly from undergraduate psychology courses, and these participants identified the physical stressor, a pain tolerance test, as a deception. They understood that the IRB would not allow us to physically harm them. We also eliminated three participants for having unusual baseline cardiac output from our analysis. Finally, one participant did not feel comfortable in the social stressor, the speech condition, and did not sign the consent form for us to use her data. Altogether, six participants were eliminated from the overall dataset. These six

participants represented 5% of the total participants who completed the study, resulting in a final sample of N=108.

Materials and Procedure

After being recruited on the Arizona State SONA system, participants were invited to come into our laboratory to participate in the study. Before beginning the study, participants were presented with an Information Sheet. The Information Sheet explained that our study is interested in studying individual's responses to stress in a variety of settings and tasks. Because this Information Sheet does not completely debrief our participant and includes mild deception, participants were asked to verbally consent to the experimental tasks. After consenting to continue, participants were prepared for EKG and impedance cardiography to be collected.

Participants were placed in one of two groups, a physical stressor condition or a social stressor condition. Baselines physiological data was collected from participants as they completed two electronic surveys. After taking the UCLA Loneliness Questionnaire and the Experiences With Bullying Questionnaire, participants in the physical stressor condition were told that they would be receive a pain tolerance test.

In the social stressor condition, baseline cardiac output and other physiological measurements were collected from participants as they completed the same surveys participants in the physical condition completed. After they completed the surveys, the participants were told that they would give a recorded speech detailing their plans for the future. Participants were told that these videos would later be reviewed by their peers for quality and content.

As each group anticipated their stressor, five minutes of baseline physiological measurements were collected. After the five minutes were over, participants were debriefed and informed consent was collected. Cardiovascular responses to the manipulation were assessed along two dimensions. Sympathetic activity was assessed via the *cardiac output* CO, representing volume of blood pumped by the heart per heartbeat. Higher CO values indicate greater sympathetic activation, and higher stress.

To measure cardiac output, three new variables were created. The first variable was an average of baseline cardiac output. The second variable was average cardiac output during the five minutes the participant anticipated the stressor. Subtracting this anticipation CO score from the baseline CO score gave us a third variable, CO CHANGE. This variable was used in our statistical analysis.

These measures were derived via ECG, using a standard lead II configuration to obtain heart rate, and a belt around the upper torso to capture respiration (methods described in Sherwood et al., 1990). All signals were captured using a Bionex Impedance Amplifier, and processed using interactive software from Mindware Technologies Ltd. [Gahana, OH]. Cardiovascular activity was measured throughout the session, and averaged into one-minute periods for analysis.

Baseline physiological information was collected from participants as they completed two online questionnaires. The first questionnaire was the Experiences with Bullying questionnaire (1993). This survey is designed to measure what type of experiences with bullying each participant has had, and at what point in their life it

occurred. The survey asks participants to identify whether they had experiences with social or physical bullying before high school, during high school, and after high school.

Bullying was defined as repeated, intentional aggression directed against a less powerful target and participants were asked to keep this definition in mind as they answered the questions. This survey has 10 questions that ask participants to identify their experiences and how frequently they occurred throughout Gradeschool and High school. During analysis, we recode the bullying frequency items (bullying before highschool and bullying during high school) into a “never” (0), “occasionally” (1-2) and “frequently” (3-4) scale, based on Dan Olweus’ recommended approach. We then combine the two items, “*How often were you a victim of bullying before high school?*” and “*How often were you a victim of bullying during high school?*”

The second survey that we administered was the UCLA Loneliness Questionnaire (Russell, 1996). This survey is designed to determine participant’s *perception* of their own social support network and to measure their feelings of isolation in comparison to measuring their actual, enacted support. This questionnaire was a survey in which participants were asked to rate their own experiences with the statement on a 4-point scale. Participants were asked how often certain emotions pertained to them and instructed to respond with either a *1=never*, *2=rarely*, *3=sometimes* or *4=always*.

After reverse coding, all of the UCLA Loneliness scale items were added together to get a cumulative score for feelings of loneliness and perceived social support. Higher scores indicated greater feelings of loneliness and a lower perception of social support.

DATA ANALYSIS

Hypotheses 1 and 2: EXPERIENCES WITH BULLYING WILL HAVE AN IMPACT ON FUTURE PHYSIOLOGICAL RESPONSES TO STRESS AND LONELINESS WILL HAVE A DIRECT EFFECT ON FUTURE PHYSIOLOGICAL RESPONSES TO STRESS.

LONELINESS WILL ALSO MODERATE THE EFFECT OF BULLYING AND ALTERED PHYSIOLOGICAL RESPONSES TO STRESSORS.

Hypothesis one and hypothesis two were analyzed simultaneously in a regression analysis. We used the participant's Lonely Total, Bullying Total and Stressor Condition as independent variables and cardiac output as a dependent variable. We also included all 2-way interactions (LonelyXBullying, LonelyXCondition, and BullyingXCondition), as well as the 3-way interaction between Lonely Total, Bullying Total and Stressor condition. The overall model was significant analysis were significant ($F=31.345$, $P<.001$). All analysis were significant. For a complete regression analysis summary table, see table 1. For a coefficients correlations table, see Table 2

Table 1- Regression Summary For Variables Predicting CO

MODEL	B	β	SIG
CONDITION	36270022.24	18.689	.000
LONELYTOTAL	657850.562	2.32	.000
BULLYTOTAL	11184889.92	16.555	.000
LONELYCOND	-667639.718	-18.861	.000
LONELYBULLY	-206803.493	-17.128	.000
BULLYCOND	-11319674	-27.027	.000
THREEWAY	208840.016	27.694	.000

Table 2
Correlation Coefficient Table

Model		ThreeWay	LONELYTOTAL	BULLY_TOTAL	CONDITION	LonelyBully	LonelyCond	BullyCond	
1	Correlations	ThreeWay	1.000	.709	.755	.929	-.757	-.932	-.997
		LONELYTOTAL	.709	1.000	.938	.738	-.937	-.749	-.696
		BULLY_TOTAL	.755	.938	1.000	.693	-.997	-.703	-.741
		CONDITION	.929	.738	.693	1.000	-.688	-.998	-.931
		LonelyBully	-.757	-.937	-.997	-.688	1.000	.701	.739
		LonelyCond	-.932	-.749	-.703	-.998	.701	1.000	.929
		BullyCond	-.997	-.696	-.741	-.931	.739	.929	1.000
Covariances	ThreeWay	518537906.8	1113860019	15482256311	1.040E+11	-296953978.0	-1955381894	-2.760E+10	
	LONELYTOTAL	1113860019	4762742938	58328655414	2.505E+11	-1113860019	-4762742938	-5.833E+10	
	BULLY_TOTAL	15482256311	58328655414	8.115E+11	3.069E+12	-1.548E+10	-5.833E+10	-8.115E+11	
	CONDITION	1.040E+11	2.505E+11	3.069E+12	2.417E+13	-5.831E+10	-4.520E+11	-5.561E+12	
	LonelyBully	-296953978.0	-1113860019	-1.548E+10	-5.831E+10	296953978.0	1113860019	15482256311	
	LonelyCond	-1955381894	-4762742938	-5.833E+10	-4.520E+11	1113860019	8491890516	1.040E+11	
	BullyCond	-2.760E+10	-5.833E+10	-8.115E+11	-5.561E+12	15482256311	1.040E+11	1.476E+12	

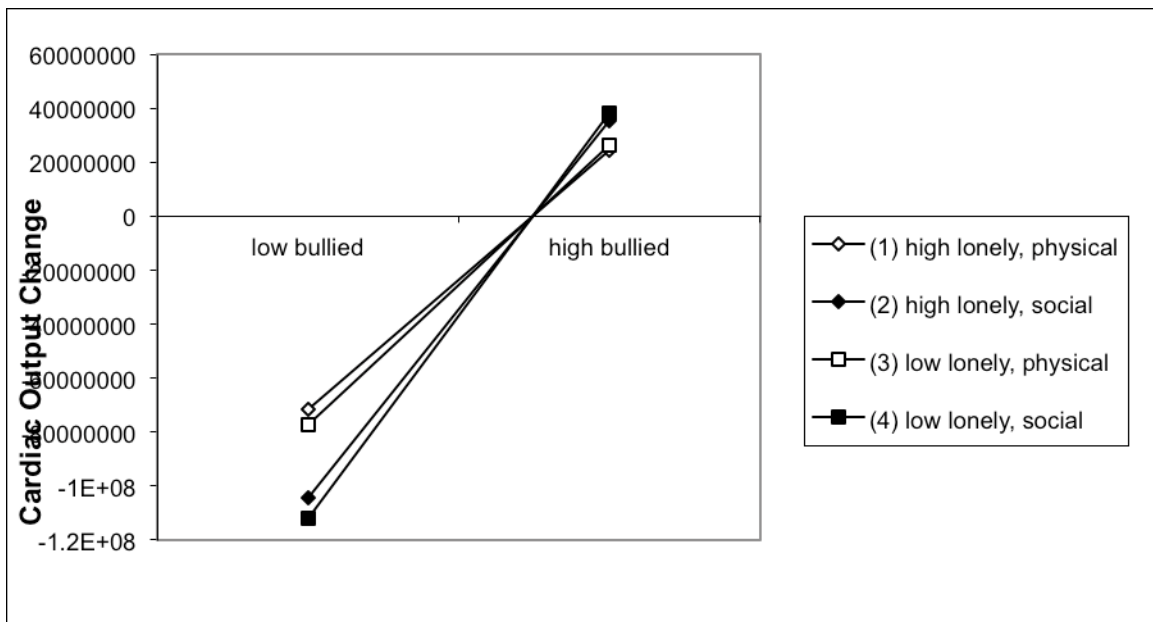
a. Dependent Variable: CO_CHANGE

These results indicate that participants who were bullied are more “stressed” overall than participants who are not bullied in both stressor conditions.

In order to probe this interaction, a simple slopes analysis was used to determine which combination of moderators were significant. The results of this analysis are summarized in Figure 1.

Figure 1

Simple Slopes Analysis



As seen in figure 1, the effect of bullying on cardiac output was greater when anticipating social stress (shaded points) than when anticipating physical stress (white points; main effects $p < .001$). We decomposed this interaction further by conducting tests of slope differences.

High Lonely participants in the physical condition had significantly different cardiac output than High Lonely participants in the social condition ($t = 4.975, p < .001$). The direction of this difference is qualified by the participant's bully victimization history.

High lonely participants in the physical condition and low lonely participants in the physical condition had significantly different cardiac output levels ($t=3.99, p<.001$). Participants high in loneliness in the social condition had significantly different CO levels than participants low in loneliness in the physical condition ($t=2.055, p<.001$). Again, the direction of these differences are qualified by the participant's bullying history.

High lonely and low lonely participants in the social condition had significantly different CO output levels ($t=-4.152, p<.001$), with individuals high in loneliness displaying more stress. Participants scoring low in loneliness had significantly different CO output levels when in the social or physical condition ($t=-7.442, p<.001$), with higher levels of CO output in the social stressor condition.

In the social condition, participants who had high levels of bully victimization and low loneliness had higher levels of cardiac output change than participants high in bully victimization with high levels of loneliness. This effect was not significant. However, participants low in bully victimization and high in loneliness were significantly more stressed than those participants low in bully victimization and low in loneliness ($t=4.152, p<0$). These results suggest that loneliness did have a moderating effect in the social condition in individuals with low bully victimization histories, but not in individuals with high bully victimization histories.

This pattern was also seen in the physical condition. Participants who had high levels of bully victimization and low levels of loneliness had higher levels of cardiac output change than participants high in bully victimization with high levels of loneliness

Participants with low levels of bully victimization and higher levels of loneliness were significantly more stressed out than participants with low levels of bully victimization and lower levels of loneliness.

Hypothesis 3: THE TYPE OF BULLYING ONE EXPERIENCED AS AN ADOLESCENT WILL BE A MODERATOR BETWEEN BULLY VICTIMIZATION AND ALTERED STRESS RESPONSES.

Our third hypothesis, whether or not the type of bullying one experienced would have an interaction effect with the stressor condition they were assigned to, was unfortunately unable to be analyzed.

The frequency of reported types of bully victimization weighed heavily on the side of social bullying, with only one participant reporting physical bullying either before or during High School. For a complete summary of bully victimization frequencies, see Table 2.

Table 2- Distribution of “Type of Bullying” Experienced Before and During High School

BULLYING	FREQ HS	TOTAL %	FREQ BEFORE HS	TOTAL %
NOT BULLIED	56	49.1	33	37.1
SOCIAL	52	45.6	58	9
BOTH	6	5.5	22	50.9
TOTAL	114	100	114	100

DISCUSSION

Our results revealed that both loneliness and bully victimization had a direct impact on one’s physiological responses to both stressor conditions. This response was especially strong when participants were anticipating the physical stressor. Loneliness

did, in fact, moderate the relationship between bully victimization and cardiac output, though not in the direction we anticipated. Non-bullied participants who were high in loneliness were more stressed out in both conditions than bullied participants who were high in loneliness. These results could suggest that the experience of bullying could desensitize its victim to feelings of social support and loneliness. Perhaps bully victims do not receive the positive benefits of social support.

In non-bullied participants, loneliness had a direct and positive relationship with cardiac output, indicating levels of loneliness in bully victims moderated the relationship between bully victimization and elevated cardiac output in response to future stressors.

Experiences with Bullying/Cardiac Output

Our results showed that bully victimization in adolescence does alter responses to stress later in life. In both the physical and social stressor condition, experiences with bullying were associated with higher cardiac output, indicating that participants with a history of bully victimization had elevated responses to stress in comparison to participants who did not have a history of bully victimization.

These results are best understood when understanding bullying as a chronic stressor. Like other chronic stressors, individuals who are exposed to the bullying have altered responses to stress later in life, suggesting difficulties in regulating individual responses to stressors after enduring chronic stress.

These results are also best understood when examining individual feelings of loneliness as a moderator between chronic stress and future responses to social and

physical stressors. Individual feelings of loneliness could alter responses to bully victimization, as well as a wide variety of other stressors.

Loneliness/Cardiac Output

Our results showed that feelings of loneliness and isolation are associated with elevated responses to stress in participants with bullying histories. Non-Bullied participants high in loneliness had higher cardiac output in comparison to bullied participants high in loneliness. Previous literature on loneliness suggests that when individuals feel lonely or isolated, the negative impacts of a stressor can have magnified effects (Cacioppo et al, 2006). One suggested explanation for our results is that, due to the isolating nature of bullying, bully victims have to find alternate ways to deal with their stress that does not involve social support networks. This difference in perceptions of social support could explain why bully victims have different responses to future stressors later in life (Newman et al, 2005).

Another unanticipated result emerged in our non-bullied, low lonely sample. These individuals showed higher cardiac output in response to the physical stressor than non-bullied participants, high in loneliness. One suggested response for this outcome is that, without previous experience of bullying or dealing with feelings of loneliness and isolation, these participants may find dealing with a stressor alone more stressful. Without their social support group, anticipating a stressor can be a very stressful experience if they were dependent on the feelings of support they typically receive. Perhaps previously their feelings of low loneliness buffered them against the negative consequences of stress.

Alone in a new place, left to anticipate an unknown stressor alone, these participants may feel higher levels of stress in their newfound loneliness.

Another explanation for this unanticipated result could be in our physical manipulation itself. Since our participants are pooled from mostly psychology undergraduate students, there is a chance that many of them did not believe the ambiguous “pain tolerance test” and did not anticipate its occurrence for this reason. Perhaps non-bullied, psychology student participants were better able to determine this “fake threat” more easily than lonely students. The high-lonely participants may have elevated physiological responses to stress before they can rationally determine the improbability of a pain tolerance test stressor and relax in anticipation of the stressor.

Type of Bullying/Stressor Condition

While unhelpful in analyzing our hypothesis, the distribution of the types of bullying victimization that participants experienced were on par with the distributions in the American school system (Olweus, 1993). This distribution left those who experienced physical bullying severely under represented, with only one person reporting being physically bullied before high school and zero reporting being physically bullied during high school.

In an attempt to better understand the “Type of Bullying” distribution, we combined those participants who identified as having experiences with “BOTH” types of bullying (Social and Non-Social) before and after High School together with the category of “PHYSICAL BULLYING”. It was our rationale that physical bullying rarely occurred

without social components (ie. Lies and Name-Calling), so this was a representative combination.

Approximately half of the participants reported having no experiences with bullying. While this pattern fits with documented trends, even after combining the categories “BOTH” and “PHYSICAL”, it did not give us enough data to determine a relationship between the type of bully victimization one encountered as an adolescent and different physiological and emotional responses to the type of future stressor bully victims are faced with.

One possible explanation for this lack of physical bullying could be an increase in the use of social media technologies among adolescents. Cyber bullying is a growing problem among adolescents, as students can now anonymously be humiliated on a larger scale (Bauman & Newman, 2012). This results in an escape from punishment for the bully and ultimate exposure for the victim. This type of bullying could result in an increase in social bullying and a drop off of physical bullying among school age and high school students.

Another possible explanation for the results on this one sided distribution, is the idea that those who are physically bullied are having the most severe responses to stress, and are therefore not being included in our sample. One can see from the results in the physical condition that bully victims who feel lonely have the most extreme responses to acute stress. Perhaps the victims of physical bullying have such extreme changes to their physiological responses to stress that they are not able to manage the daily pressures of reaching the level of a college student. Our study primarily polls from an online database

consisting of graduate and undergraduate students. These students may not represent the lower tier of responses to bully victimization. That is, it is possible that the most affected by their victimization history are not represented in a college student sample. Future research should consider surveying different populations to examine the long term effects of bullying and other chronic stressors.

Finally, due to the results of the voluntary participation recruitment tactic used when acquiring participants, we ran the risk that groups prone to social anxiety, may be the case for many bully victims, will not participate in the experiment.

Limitations and Future Directions

Due to the uneven distribution of participants who experienced physical or social bullying before and during high school, we were unable to explore if the type of chronic stressor one endures as a moderator between these experiences with chronic stress and future physiological responses to stress is in action. As a future direction, collecting a more evenly representative sample for physical and socially bullied participants to analyze in terms of a moderator could provide meaningful information concerning the interaction between chronic stress and future responses to stressors.

Another limitation to this study is the range of bully victimization we are surveying by pooling undergraduate college students. If early experiences with bully victimization or other chronic stressors impairs one's ability to regulate their response to stress, by mainly studying college students, we may be missing a large portion of the bullied population who were unable to deal with the stressors one must face to succeed in a college atmosphere. Studying other populations and their experiences with bullying and

responses to stress could provide a wider range of data concerning the effects of bullying on individuals.

Finally, other potential moderators acting upon bully victimization and future physiological responses to stress should be examined. While loneliness did moderate this relationship, there are many other variables that could impact the relationship between bully victimization and future stress response. For example, individual levels of testosterone or socioeconomic status could be explored as possible moderators. Individual coping strategies in response to bullying could also have an impact on long term responses to stress.

CONCLUSION

In short, there are many pathways that need to be explored to better understand the complicated relationship between bully victimization and future physiological stress responses. As a chronic stressor, bullying alters one's long term response to stress in a variety of ways (Newman et al, 2005). In our present study, we found that bullying elevated a participant's cardiac output, indicating that they more "stressed out" than participants who did not have experiences with bullying. While we did find this direct effect, investigation into the possible moderator of loneliness brought more clarity to the overall picture of chronic stress and future stress response. This study did not find a direct relationship between bully victimization and loneliness.

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APPENDIX A

EXPERIENCES WITH BULLYING QUESTIONNAIRE

The questions on the following pages all deal with your past and present experiences with bullying. Bullying is typically defined as repeated, intentional aggression directed against a less powerful target. Please keep this definition in mind as you answer the following questions, using the scales provided. You are free to skip any questions that make you uncomfortable.

1. How often were you a victim of bullying during high school?
 Not at all Once or twice Occasionally Frequently Very Often

2. If you were a victim of bullying during high school, was it primarily physical, verbal / emotional, or both?
 N/A (not bullied) Physical Verbal / Emotional Both

3. If you were a victim of bullying during high school, was it done primarily by males, females, or both?
 N/A (not bullied) Males Females Both

4. How often were you a victim of bullying before high school?
 Not at all Once or twice Occasionally Frequently Very Often

5. If you were a victim of bullying before high school, was it primarily physical, verbal / emotional, or both?
 N/A (not bullied) Physical Verbal / Emotional Both N/A

6. If you were a victim of bullying before high school, was it done primarily by males, females, or both?
 N/A(not bullied) Males Females Both N/A

7. How often did you hit or tease others during high school?
 Not at all Once or twice Occasionally Frequently Very Often

8. How often did you hit or tease others before high school?
 Not at all Once or twice Occasionally Frequently Very Often

9. How popular were you with your peers during high school?
 Not at all A little popular Somewhat popular Fairly popular Very popular

10. How isolated were you from your peers during high school?
 Not at all A little isolated Somewhat isolated Fairly isolated Very isolated

APPENDIX B

UCLA LONELINESS SCALE

TABLE 1
UCLA Loneliness Scale (Version 3)

Instructions: The following statements describe how people sometimes feel. For each statement, please indicate how often you feel the way described by writing a number in the space provided. Here is an example:

How often do you feel happy?

If you never felt happy, you would respond "never"; if you always feel happy, you would respond "always."

	<u>NEVER</u> 1	<u>RARELY</u> 2	<u>SOMETIMES</u> 3	<u>ALWAYS</u> 4	
*1.					_____
2.					_____
3.					_____
4.					_____
*5.					_____
*6.					_____
7.					_____
8.					_____
*9.					_____
*10.					_____
11.					_____
12.					_____
13.					_____
14.					_____
*15.					_____
*16.					_____
17.					_____
18.					_____
*19.					_____
*20.					_____

Scoring:

Items that are asterisked should be reversed (i.e., 1 = 4, 2 = 3, 3 = 2, 4 = 1), and the scores for each item then summed together. Higher scores indicate greater degrees of loneliness.

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