

Perceptions of Pain Tolerance and Preference for Social Support as Functions of Personality

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ABSTRACT. The current research focused on the convergence of personality, perceptions of pain tolerance, and preference for social support as a pain management technique. We expected that those scoring higher in extraversion would have a preference for social support as a pain management technique as opposed to nonsocial options. Additionally, we hypothesized that those scoring higher in extraversion would rate themselves as having higher levels of pain tolerance. Ninety-five college students participated in this study. We found support for the latter hypothesis ($r = .22$, $p = .02$ [1-tailed]). Additional analyses revealed an inverse relationship between neuroticism and self-reported pain tolerance ($r = -.33$, $p = .001$ [2-tailed]) and an interaction between sex, sports participation, and neuroticism with regard to pain tolerance ratings, $F(1, 79) = 4.79$, $p = .03$, $\eta^2 = .05$. This research supports existing literature associating extraversion, sex, and athleticism with pain tolerance and provides additional foundation for future studies that consider these variables in real-world settings, moving past the survey format.

Individuals have sought effective coping techniques in response to the variety of acute and chronic painful situations that they encounter, handling this spectrum of pain with many strategies (Tse, Pun, & Benzie, 2005). For many reasons, people use psychological pain management methods, such as breathing techniques and distraction, rather than medications—some by choice and some due to necessity (e.g., in many emergency situations there is no access to analgesic pain management). Because we cannot always rely on analgesics and because pain medications can be costly (Gustavsson, et al., 2012) or lead to adverse effects such as dependency and abuse (Maxwell, 2011), it is important that we explore alternative methods of pain relief and consider how to get the best results from these methods. Current research focuses on the potential benefits of social support as an alternative coping strategy in painful situations and considers personality variables that may facilitate its effectiveness.

Social support seems to be an ideal strategy—something that one might seek out for the express purpose of reducing pain immediately and long term—for managing pain and includes little to no side effects and little to no cost. Indeed, research over the past few decades has demonstrated that social support has beneficial effects on the psychological and physical well-being of those suffering from chronic illness (Holtzman, Newth, & Delongis, 2004). Social support has been endorsed as an effective strategy for pain management, as an option for people in pain that provides positive social benefits and can provide a buffering effect for pain through various means including physical/tangible support, affection, reassurance, and emotional support (Brody, 2012; Wilson, 2007). It is important to explore the situations in which social support is most effective. Rather than assuming that social support is positively correlated with pain outcomes for all patients, we should consider

Faculty mentor: Christy D. Wolfe

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factors of effective social support, as well as which individuals will respond most positively to that type of support.

Personality and Health

Personality is associated with overall health. For example, Jerant, Chapman, and Franks (2008) noted that individuals with lower levels of extraversion have been found to have lower levels of self-reported health. In a study on quality of life in patients with Parkinson's disease, Dubayova et al. (2009) found that extraversion indirectly influenced quality of life in patients with chronic diseases—high extraversion led people to be sociable, prefer changes, crave excitement, and act impulsively while low extraversion led individuals to be more self-centered and more sensitive to stress. Dubayova and colleagues (2009) hypothesized that extraversion was correlated with the level of coping with chronic disease, thus influencing the level of quality of life. Factors associated with extraversion have been linked with creating a positive cycle when dealing with depression. Cukrowicz, Franzese, Thorp, Cheavens, and Lynch (2008) found that extroverts in their sample were less likely to withdraw from relationships when feeling depressed; this was posited to increase social support which in turn could increase the efforts of extroverts to maintain social relationships even in times of depression, creating a positive cycle. It seems likely that this pattern may hold true for extroverts experiencing physical pain.

Personality and Pain Management

Lynn and Eysenck (1961) supported Eysenck's previous assertions that extraversion would be positively correlated with pain tolerance levels, explaining this finding by suggesting that individuals higher in extraversion inhibit painful stimuli more quickly than those low in extraversion, and that those low in extraversion would be quicker to condition a fearful response to future pain. Likewise, Ramirez-Maestre, Lopez Martinez, and Zarazaga (2004) considered various personality traits and chronic pain, and found that high-level extraversion predicted a greater use of active and effective strategies for handling pain. In this case, introverts may need more aid in learning how to use (and how to use most effectively and appropriately) coping strategies for managing pain. In a study investigating the chronic pain associated with rheumatoid arthritis, individuals scoring higher in extraversion were more likely than

introverts to use and benefit from cognitive reframing (Newth & Delongis, 2004).

In an additional study on chronic pain caused by rheumatoid arthritis, Holtzman et al. (2004) examined the role of satisfaction and disappointment with support in coping and pain severity, and found that support influenced pain severity through encouraging specific coping strategies as well as by affecting the effectiveness with which these coping strategies were employed. Their research supported interpersonal models of coping and suggested "that coping does not occur in a social vacuum and that interpersonal factors are important contextual factors in understanding coping and its effects...findings from the current study indicate that social support and coping are inextricably linked" (Holtzman et al., 2004, p. 690). In essence, social support provides just what it is suggested that people need in order to reduce the level of perceived pain—social support encourages people to effectively use coping strategies.

Finally, Moldovan, Onac, Vantu, Szentagotai, and Onac (2009) cited two psychological factors that influence pain outcomes: pain catastrophizing and response expectancies. They suggested that high levels of pain do not necessarily produce high emotional distress, but that it is the interpretation of events that explains our feelings and behaviors. These findings suggest that by influencing the interpretation of events (or pain), certainly a role that social support might be able to play, we can impact the perception of pain and thus influence pain tolerance. These findings imply that perhaps we need to increase the types of social support that reduce pain catastrophizing (e.g., providing a levelheaded appraisal of the situation, reducing distress,) and increasing positive expectations of pain outcomes (promoting positive thinking for the person in pain).

Need for Further Research

The previously mentioned studies have looked at the issues of personality type, social support, and pain management, but it is important to consider these three issues in conjunction. We must consider the possibility that personality type might influence the effectiveness of using particular methods in reducing pain. As it is important for each individual to know the best setting for them to learn, the best way for them to handle frustration, the best way to express creativity, and so forth, perhaps it is equally important to begin to understand that individuals may have individual pain management styles,

influenced by various factors potentially including personality type. Because social support relates clearly to extraversion, this might be an excellent first place to look for connections. Past research points to extraversion as being a factor in coping with pain, and to social support being effective in pain management, but is social support more effective for those who rank higher in extraversion? Would these findings help to explain the discrepancy in pain outcomes between extroverts (who have been seen to respond more positively in painful situations) and introverts? If social support is not particularly effective for those low in extraversion, should we encourage the use of social support techniques only among those for whom it is most effective, or perhaps “teach” individuals low in extraversion how to seek and effectively benefit from social support? This information could help us in responding to both acute and chronic pain, and in assessing just how important social support is for various individuals.

Additional variables of interest. Importantly, previous research has identified additional variables that are associated with pain tolerance, namely biological sex and sports participation. Specifically, previous research showed that women seek treatment for pain more frequently than men (Wilson, 2006) and are more likely to report pain than males (Leboeuf-Yde, Nielsen, Kyvik, Fejer, & Hartvigsen, 2009). Ryan and Foster (1967) found that athletes reported higher levels of pain tolerance than nonathletes. We considered it important to include these additional and potentially influential variables as covariates in order to obtain a clearer understanding of the factors that influence pain perception.

The current study focused on the combination of personality, perceptions of pain tolerance, and preference for social support. The following research questions and hypotheses were addressed: First, is extraversion related to pain tolerance and a preference for certain pain management techniques? The primary hypotheses were that those high in extraversion would rate themselves as having a higher pain tolerance than those low in extraversion, and that individuals high in extraversion would have a higher preference for social support as a method for pain management than those low in extraversion. Additional research questions were explored. Specifically, sex differences in pain tolerance were explored. Men were expected to report higher levels of pain tolerance than women. Associations between participation

in organized sports and pain tolerance were also explored, and we expected that individuals who participated in sports would report higher levels of pain tolerance than non-participants. Finally, associations between pain tolerance and the remaining personality dimensions (openness to new experiences, agreeableness, conscientiousness, and neuroticism) were explored without specific predictions.

Method

Participants

The participants in this study consisted of 95 college students (46 women and 43 men, 6 unreported) attending a private university. All participants were undergraduate students. An additional demographic that was considered important was involvement in sports; 36 participants in the study were participants in organized sports (12 women, 21 men, 3 unreported), 59 were not (34 women, 22 men, 3 unreported).

Sampling Procedures

Participants from psychology courses within the university were invited to participate and offered extra credit within those courses. Participation was self-selected; participation was not required in any courses. Data were collected on campus during free period in an unoccupied classroom; the survey was distributed and collected by the experimenter. After participation, participants were debriefed and thanked, and professors were notified of the names of participating students via e-mail in order for participants to receive extra credit. The procedure and measures used were reviewed and approved by the university's Institutional Review Board.

Measures

The materials for the survey included a questionnaire packet consisting of the informed consent form, a personality assessment, the pain assessment questionnaire, and an explanation. The informed consent included a request for contact information from the students (name and e-mail address) to invite those who completed the survey to participate in a potential follow up study.

Personality assessment. The personality assessment included 60 questions taken from the International Personality Item Pool website (<http://ipip.ori.org>) to assess five personality dimensions that were analogous to the Big 5 (i.e., 10 questions for the personality traits of openness to new experiences, conscientiousness,

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agreeableness, and neuroticism and 20 questions to gauge levels of extraversion). These items have a Cronbach's alpha ratings of .82 (agreeableness), .79 (conscientiousness), .86 (neuroticism), .84 (openness), and .91 (extraversion).

Pain experience and management. This pain assessment questionnaire was developed by the researcher as no previously existing questionnaire was found to meet the needs of this research. Namely, this questionnaire featured several questions assessing interpretations of pain and preference for various pain management methods. The pain experience and management questions included one question about pain tolerance: "Rate your overall physical pain tolerance on a scale of 1-5. Would you estimate that you are more sensitive than others." The rating scale ranged from 1 (*more sensitive than others*) to 5 (*much better at tolerating physical pain than others*) and invited participants to report their preferred pain management methods (e.g., "Which of the following pain management techniques do you use? Please circle all that apply: breathing, meditation, relaxation, swearing, yelling, physical support from a friend [hand holding, back massage, etc.], emotional support from a friend [talking, distraction, etc.], gritting teeth, holding breath, taking pain medicine, other _____"). Participants also were asked to choose social support, nonsocial support, or neither for the strategy that they felt was most helpful, that they used most often, and that they preferred.

Results

Descriptive statistics are reported for the pain tolerance ratings, the personality assessment scales, the selection of pain management techniques used, and the most helpful, most frequently used, and preferred pain management technique categorized by type (social or nonsocial). See Tables 1, 2, and 3. Measured on a Likert-type scale, the ratings of pain tolerance were considered interval level for the purposes of statistical analyses. The pain tolerance distribution was nonnormal, (skewness = -.27, kurtosis = -.41, Kolmogorov-Smirnov, $p < .001$). Thus, this distribution was log transformed to normalize the distribution. This transformed variable was used in all analyses including pain tolerance.

Primary Analyses

Association between extraversion and pain tolerance. A positive association between extraversion and pain tolerance was expected. To test this hypothesis, a Pearson correlation analysis was

TABLE 1

Descriptive Statistics for Pain Tolerance and Personality Scale Scores

Measure	<i>M</i>	<i>SD</i>
Pain Tolerance	3.63	1.00
Pain Tolerance (log)	.54	.14
Extraversion	3.44	.73
Neuroticism	2.48	.75
Conscientiousness	3.58	.62
Openness	3.47	.69
Agreeableness	3.95	.61

TABLE 2

Participants' Reports of Specific Pain Management Techniques

Technique	Percent
Breathing	68
Emotional Social Support	56
Gritting Teeth	33
Holding Breath	19
Meditation	21
Physical Social Support	37
Relaxation	61
Swearing	55
Taking Medicine	34
Yelling	34

TABLE 3

Participants' Report of Helpfulness of Pain Management Techniques

Category	Most Helpful	Most Frequent	Preferred
Social Support	20%	17%	17%
Non-social Support	62%	67%	49%
None/Other	18%	16%	34%

conducted on extraversion scores and self-reported pain tolerance ratings. The results of this analysis yielded support for the hypothesis, $r = .22$, $p = .02$ (1-tailed). However, this association was different for women ($r = .11$, $p = .25$) and men ($r = .35$, $p = .01$).

Association between extraversion and preference for social support in painful situations. We expected a positive association between extraversion and preference for social support (emotional or physical support) as a pain management technique. Thus, those participants who favored pain

tolerance techniques including social support would have higher extraversion scores than those participants who did not indicate a preference for such pain tolerance techniques. An independent group's *t* test revealed no statistically significant support for this hypothesis, $t(60) = -.63$, $p = .53$ (2-tailed).

Secondary Analyses

Sex and pain tolerance. An independent groups *t* test was conducted to observe any differences between men and women in self-reported pain tolerance. This *t* test supported the hypothesis that men ($M = .58$, $SD = .13$) would rate their pain tolerance higher than women ($M = .50$, $SD = .14$), $t(85) = -3.05$, $p = .002$ (1-tailed).

Participation in organized sports and pain tolerance. Potential differences in pain tolerance as a function of participation in organized sports were explored. Because sex was associated with pain tolerance in the previous analysis, it had the potential to moderate the association between participation in sports and pain tolerance. Thus, a 2 (sex) \times 2 (sports participation) ANOVA was performed on the pain tolerance scores. The results of this analysis indicated a main effect for sports participation, $F(1, 83) = 4.33$, $p = .04$, $\eta^2 = .04$, with those participants with sports experience indicating a higher tolerance for pain than those without sports experience. The interaction between sex and sports participation was significant, $F(1, 83) = 4.79$, $p = .03$, $\eta^2 = .05$. Sports participants (regardless of biological sex) indicated a higher tolerance for pain than nonsports participants, but nonparticipant men rated their pain tolerance as being only minimally lower than sports participant men, whereas women who did not participate in sports rated their pain tolerance as being well below the pain tolerance of their sports participant counterparts (see Figure 1).

Additional personality factors and pain tolerance. To explore any potential associations between personality and pain tolerance, a series of Pearson correlations were conducted on the pain tolerance ratings and the scores of the remaining personality scales (i.e., neuroticism, openness, conscientiousness, and agreeableness). A strong, negative association was found between neuroticism and pain tolerance, $r = -.33$, $p = .001$ (2-tailed). Associations were not found between pain tolerance and openness, conscientiousness, or agreeableness (see Table 4).

Because of the strong association found between neuroticism and pain tolerance, a stepwise

TABLE 4

Associations Between Pain Tolerance and Personality Scales

Measure	<i>r</i>	<i>p</i>
Extraversion	.22	.04
Neuroticism	-.33	.01
Conscientiousness	.00	.99
Agreeableness	.00	.98
Openness	-.03	.78

Note. All analyses were 2-tailed.

regression was conducted to determine if neuroticism explained variance in pain tolerance above and beyond the extraversion variable. In Step 1, with pain tolerance as the dependent variable, extraversion was entered as the independent variable; a significant model was achieved, $F(1, 90) = 4.50$, $p = .037$, with 5% of the variability in pain tolerance explained by extraversion. In Step 2, with the addition of neuroticism as a second independent variable, another significant model was found, $F(2, 89) = 7.03$, $p = .001$. Neuroticism was a valuable addition in the explanation of variance in pain tolerance, now with 14% of the variance being explained by extraversion and neuroticism (see Table 5).

Neuroticism, participation in sports, sex, and pain tolerance. Due to the strong association between perceptions of pain tolerance and neuroticism, potential differences in pain tolerance as a function of neuroticism, sex, and participation in organized sports were explored. A 2 (sex) \times 2 (sports participation) \times 2 (high and low neuroticism) ANOVA was conducted on the pain tolerance scores. The results of this analysis revealed a main effect for sports participation, $F(1, 79) = 4.68$, $p = .03$, $\eta^2 = .04$. Those who participated in sports

TABLE 5

Regression Analysis With Extraversion and Neuroticism Predicting Self-Reported Pain Tolerance ($N = 95$)

Step and Variable	B	SE B	β	R^2	ΔR^2
Step 1:				.05*	
Extraversion	.04	.02	.22*		
Step 2:				.14**	.09**
Extraversion	.03	.02	.16		
Neuroticism	-.06	.02	-.30**		

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

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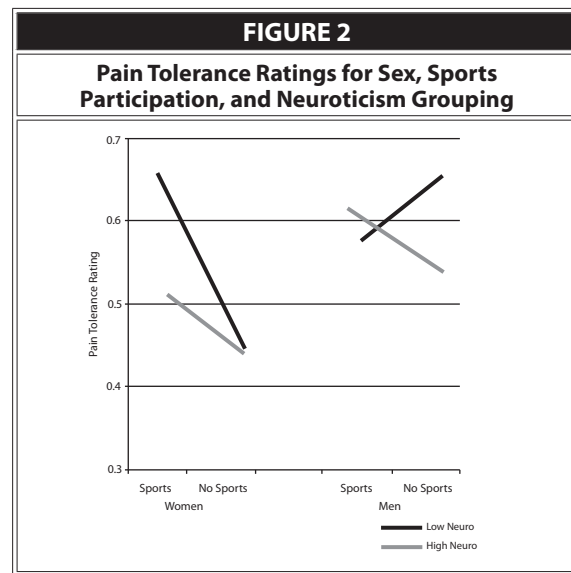
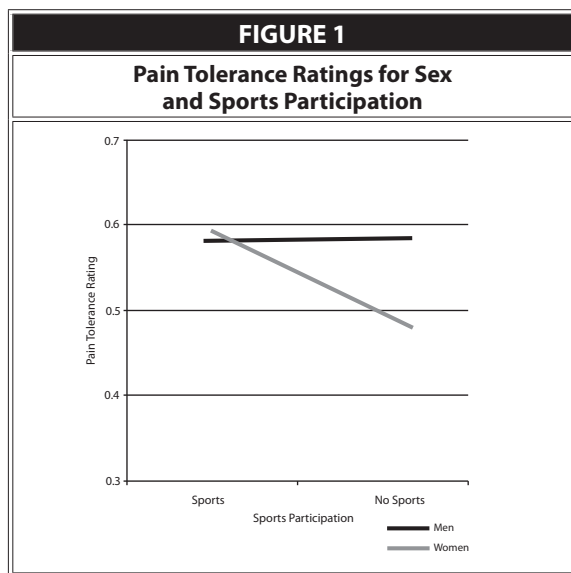
($M = .59, SD = .14$) reported higher pain tolerance than those who did not participate in sports ($M = .51, SD = .14$). These main effects were superseded by a three-way interaction $F(1, 79) = 4.79, p = .03, \eta^2 = .05$. We found that while women participating in sports who rate themselves as high in neuroticism have a higher pain tolerance than women who also participate in sports but rate themselves as low in neuroticism, all women (high and low in neuroticism) who did not participate in sports rated their pain tolerance levels as lower than their athletic counterparts (regardless of neuroticism scores). We see a different trend in men. Men participating in sports who rate themselves as low in neuroticism rate their pain tolerance as lower than those participating in sports who rate themselves as high in neuroticism, while men not participating in sports display the opposite trend. For men not participating in sports we see a pattern similar to women who do not participate in sports; those who fall into the high neuroticism category rate their pain tolerance as higher than those in the low neuroticism group (see Figure 2).

Discussion

The purpose of this study was to examine the relationship between perceptions of pain tolerance, personality, and social support as a method of pain management. The hypotheses in this study included a prediction of positive associations between extraversion and self-reported pain tolerance and between extraversion and preference for social support as a method of pain management. These variables were measured with a survey, and

analyses showed partial support for these hypotheses. The association between self-reported pain tolerance and extraversion was positive. We found that more extraverted individuals rated their pain tolerance levels more highly compared to those scoring low in extraversion. These findings were consistent with previous research in the area of extraversion and pain tolerance (Lynn & Eysenck, 1961). The association between preference for social support as a pain management method and extraversion was not statistically significant. Follow-up analyses revealed an unexpected and strong negative association between neuroticism and self-reported pain tolerance. A regression analysis showed that together, extraversion and neuroticism accounted for 14% of the variability in pain tolerance ratings, suggesting that personality variables play a large role in the perception of pain and pain tolerance. This finding supports previous research showing a negative correlation between neuroticism and pain tolerance (i.e., those higher in neuroticism rate themselves as having a significantly lower pain tolerance; Ramirez-Maestre et al., 2004). Additionally, this finding suggests that extraversion is not the only personality variable to play a large role in perceived pain tolerance; similarly, neuroticism may play a role in preference for and the efficacy of various methods of pain reduction. Findings for sex and pain tolerance supported our expectations. Women, on average, rated their pain tolerance as being lower than men.

Sex was considered as having the potential to modify the previously explored variables of personality, participation in sports, and pain tolerance



perceptions. Potential differences in pain tolerance among athletes vs. nonathletes as a function of sex were explored. Ignoring the possibility that sex was moderating findings regarding personality, participation in sports, and pain tolerance may have acted as confounding variables. For women sports participants, we saw a negative correlation between neuroticism levels and pain tolerance ratings (higher levels of neuroticism were correlated with lower pain tolerance ratings). Regardless of neuroticism, these ratings were higher than pain tolerance ratings for women nonsports participants. The pain tolerance ratings of women nonsports participants did not strongly correlate to neuroticism levels (nonparticipant women both low and high in neuroticism rated their pain tolerance similarly—both lower than sports participating women). For men, we see nearly the opposite in the area of sports participation. Men participating in sports showed a slight positive correlation between neuroticism and pain tolerance ratings, where those low in neuroticism rated their pain tolerance as lower than those high in neuroticism (this is the reverse of what we saw in women sports participants). Where for women not participating in sports we saw nearly equal pain tolerance ratings, with men we found a negative correlation; lower levels of neuroticism were correlated with higher pain tolerance ratings.

It is clear that personality type plays a role in how individuals experience painful situations. As such, it follows that we must also expect differences in the efficacy of various pain management methods when we look at different personality types. When considering individuals high or low in personality variables (particularly extraversion and neuroticism), we must expect different outcomes and therefore encourage different methods of coping; some may respond very well to social support but be unable to seek out social support, or may seek out forms of social support that are not conducive to wellness. We are offered the opportunity to tailor recovery to each individual in yet another way when we consider their personality type and the methods of support that might have the most positive outcomes for that type. Although we cannot definitively draw conclusions about the type of people that will respond most positively to social support, the data in this study allows us to consider how to mitigate the potential negative effects of certain personality variables on health, wellness, and pain perception.

Limitations

Some of the major potential confounds within the present research include threats to external validity (i.e., the college sophomore problem; Jackson, 2012), and the issue of pain tolerance being self-reported rather than a true measure of actual pain tolerance. Because the sample was relatively limited to a traditional-aged college student population, we cannot assume that these results necessarily can be extended to the general population. Another important limitation to consider is that this study relied on self-report data, rather than measures of actual pain tolerance. It is likely that some do not have a true gauge on their actual pain tolerance, or would rate themselves much differently based on their most recent painful experience (e.g., perhaps being able to clearly recall the pain of a recent injury would change an individual's perception of their pain tolerance), and thus we must remember that these data only present information about self-perceptions of pain tolerance rather than truly measuring pain tolerance. Finally, there is a possibility of experimenter effect as the target variables and hypothesis were known to the experimenter when administering the survey. There is also a possibility of participant effect as participants were asked to give identifying information that may have made some participants omit information.

Future Research

The current research illuminated the areas of personality type and preference for various pain management methods. Perhaps one of the greatest contributions of this work is to provide a foundation of data for future research, as it discusses factors that were previously not considered on conjunction with one another, and shows interactions that were unexpected yet statistically significant. For each of these factors—sex, sports participation, neuroticism ratings, and extraversion ratings—we saw some association with pain tolerance ratings. Although these findings did not always follow predicted patterns, they offer many potential arenas for further study and for real-world application. An exploration of the causal relations among these factors would be a helpful step, potentially leading to valuable treatment options; by beginning to tease out these questions, we can begin to find practical methods that might increase pain tolerance. We might consider encouraging sports participation in both women and men who rate as high in neuroticism as a method to increase pain tolerance as a preventative method. Perhaps

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a combination of social support and physical support (exercising with a friend or participating in group sports or even group physical therapy) might be a key in boosting pain tolerance and recovery from painful situations. There are many potential applications for this and other information that has yet to be gathered in this area.

A suggested follow up to the current study involves a true experiment to gauge the effectiveness of social support for high and low extraverts in a painful situations (i.e., having high and low extraverts complete a cold pressor test with and without social support from a friend and gathering data on their rating of the amount of pain caused). Looking at these factors in real-world situations, whether artificial (e.g., performing a cold pressor test) or natural (e.g., collecting data from individuals who are undergoing painful procedures or are facing a condition that causes pain) rather than gathering data from self-report surveys might provide a more accurate account of how individuals truly perform in these situations, rather than their potentially inaccurate perceptions of themselves.

Similarly, based on findings about personality type and pain tolerance, it would be fascinating to look at working with personality factors as a method for pain reduction. Perhaps we could help introverts adopt (even temporarily) some of the traits that aid extroverts in managing pain—including seeking out effective and appropriate social support. Additionally, because we know that neuroticism is strongly associated with pain tolerance ratings, one step to take might be to look at how we can lower the level of neuroticism among individuals experiencing pain (can we reduce catastrophizing and improve the interpretations of painful situations as a way of reducing pain? what type of social support is most effective in doing this?), or if those scoring higher in neuroticism have heightened arousal levels lowering the overall level of arousal might be a key factor in raising pain tolerance. Other possibilities for further study could explore the types of social support (emotional or physical) that are most effective. If we can understand the factors about the person experiencing pain and the individual providing social support that maximize the effectiveness of this strategy for pain management, we can make it more a more accessible and potent strategy for handling painful situations.

Summary

This research supports the existing literature in

finding support for the various hypotheses that were influenced by previous research (e.g., extraversion, sex, and athleticism being associated with pain tolerance). We further expand on previous data by observing these variables in conjunction with one another—looking at women and men in sports and observing the differences that are found when adding a second variable to the initial question, or looking at sex and extraversion in combination and how this relates to pain tolerance ratings. Previous reports have focused on one variable (e.g., focusing on extraversion ratings and ignoring sex) or excluded other variables all together (e.g., previous studies looking at athleticism and pain tolerance while ignoring sex and focusing solely on men). These variables were found to have significant moderating effects on the data, and thus it was important to synthesize these variables rather than considering each individually. By doing this, we found unexpected results that add completely new information to the existing data. This takes the research in the area of pain tolerance one step further, and provides something of a connecting link that will aid future studies that begin to look at these variables in a real-world setting and move past the survey format.

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Special thanks to Christy D. Wolfe for her support and assistance in revising this manuscript in preparation for publication.

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