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Letter from the Editors

Dear Readers,

It is with great pleasure that we present this issue of the New School Psychology Bulletin (NSPB). The contributions of our authors, reviewers, layout editor and all that participated in creating this issue represent the core values of the NSPB, which have remained true over the years. Since the NSPB's inception over ten years ago, the journal has served as a training model for graduate students around the world who are seeking experience in academic publishing.

Yet the NSPB is more than a training model. The journal has consistently provided an avenue for often underrepresented yet quality work of graduate students in many realms of psychological research. We recognize the value of publishing work that is exploratory in nature, does not necessarily meet the binary supposition of statistical significance, and may otherwise have been overlooked. While most of our articles do not necessarily possess these characteristics, we take great pride in the NSPB's core values.

Articles submitted to the NSPB undergo a rigorous process of review, requiring a great deal of work from both our reviewers and authors. As editors, overseeing and witnessing this progression as it unfolds is incredibly rewarding. All parties involved gain insight from the process, and the final products of this work are valuable contributions to the field.

In this issue, we feature a review of the neurological correlates of meditation, two articles that provide insight regarding group processes and collaboration, and an exploratory experiment examining the important issue of the impact that personal experiences of suicidality have on clinicians' attitudes and treatment of suicidal clients. The eclectic array of topics in this issue is representative of the population of articles submitted to the NSPB and illustrates the variability of trends in graduate student work.

We hope that you enjoy this issue as much as we have, and we look forward to publishing our next issue in 2016. We offer our appreciation to all who have contributed and we thank our readers for their support.

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Brain Basis of Samadhi: The Neuroscience of Meditative Absorption

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Scientific and clinical interest in mindfulness has seen a dramatic increase in the past ten years, but there has as yet been surprisingly little deep engagement with the traditional Buddhist literature by contemporary clinical and scientific proponents of mindfulness. This literature review summarizes a classical Theravada Buddhist framework describing samadhi, a state of consciousness often translated as meditative absorption. Following the discussion of the stages of samadhi from the traditional phenomenological perspective is a review of the cognitive, neuroimaging, and neuropsychological literature that has begun to explore the brain bases of the subjective experience of samadhi during deep meditation. Due to the incipient nature of this literature, the review makes suggestions for interpretations and future directions of empirical research. Finally, the long-term effects of meditation practice are discussed.

Keywords: meditation, samadhi, brain basis, plasticity, consciousness, altered consciousness, jhana

This literature review seeks to analyze meditative absorption by juxtaposing two very different scholarly traditions, the cognitive neurosciences and the systematized matrix of Buddhist phenomenology known as the Abhidhamma. These two paradigms differ substantially in methodology. Whereas cognitive scientists and neuroscientists approach consciousness "objectively" and philosophically, from an ontological set of priorities, the Buddhist tradition approaches consciousness phenomenologically. That is, whereas the scientific tradition asks questions like, "what is consciousness?" the Buddhist tradition guides the practitioner toward structuring consciousness such that a person may experience subjective freedom from suffering and live a moral life. Despite these epistemological and pragmatic differences, there is great potential inherent in a dialogue between these two inquiries into the mind, which have arisen in radically different cultural contexts. The Abhidhamma is a body of scholarship that began to emerge in India in the 3rd century BCE, with modern scholarship centered in Myanmar and Sri Lanka (Bhikku Bodhi, 2000). It provides a coherent matrix of extremely precise and technical phenomenological descriptions of conscious experience during meditation, and prescriptions for inducing such experiences. Contemporary secular mindfulness practice and research often tend towards relatively simplistic approaches to meditation as stress-reduction strategies (e.g. Grossman, Niemann, Schmidt, & Walach, 2004). A more sophisticated set of constructs from the Buddhist literature could be valuable to scientific researchers motivated to engage in more nuanced inquiries into conscious experiences, intentional alterations to conscious experience, and the use of altered states of consciousness for the relief of suffering. Varela's (1996) call to arms for a "neurophenomenology" that more precisely correlates conscious experience with objective neurological activity initiated an interest among the sciences of the mind in collaborating with Western phenomenologists and Buddhist practitioners. Although concepts and practices from Buddhism have been infiltrating the sciences of the mind for several decades, the Abhidhamma remains largely unknown outside its traditional scholarly centers in Sri Lanka and southeast Asia, possibly because of its daunting technicality and the relatively recent availability of its primary texts in English.

Lutz, Dunne, and Davidson (2007) provide a very broad review of the state of neuroscientific research into Buddhist meditation. They lament that the term "meditation" tends to be used so imprecisely and references such a broad range of practices and

phenomena that research scientists may find it challenging to specify exactly what kind of activity they are studying. The current review responds to Lutz et al.'s complaint, and focuses more tightly on the neurological dynamics associated with a specific series of phenomena discussed in the Abhidhamma: the stages of meditative absorption. We will refer to meditative absorption by its Buddhist name in the Pali language: samadhi. A glossary of the Buddhist terminology used in this paper may be found in the Appendix. In the Abhiddhamic tradition, samadhi is attained through a series of stages, each stage representing a qualitatively different state of consciousness. These stages are called jhana. The scope of the current work will not permit a full discussion of the models of consciousness offered in the sciences of mind and Buddhist tradition, both of which lack a hegemonic theory, but it is hoped that this offering may provide a model for future lines of dialogue. By investigating neural correlates of the jhanas, we may understand the mechanisms by which such conscious experiences are generated and why meditative absorption takes on the subjective qualities it does, in the order it does, and to the effects that it does. In terms of potential for application outside the rather esoteric context of Abhidhammic scholarship, inducement of jhanas is a skill that must be developed, but it is not beyond the scope of motivated individuals with normal human neurology to attain (Bhikku Bodhi, 1999). Such cultivation should be of interest to cognitive and neuroscientists as well as clinicians.

The Context for Meditative Absorption

Human experience of the world is mediated by the neurological substrate, and it is via dynamic patterns of cortical activation and inhibition that we represent objects in the world, mental imagery, our own bodies in space, and connections with others (Dennett, 1991). Systematic alterations of that experience, in the service of the meaningful life, human character development, and transcendence over the fear of death, have been developed in a number of cultures (Ludwig, 1966). Intentional alterations of conscious experience have likely occurred for as long as human beings have experienced what Buddhists call dukkha. Dukkha is usually translated into English as "suffering," although the Pali word means something closer to "dissatisfaction" (Bhikkhu Bodhi, 1999). In the Buddhist tradition, the central analysis of suffering and unhappiness is laid out in the Four Noble Truths:

1. All conscious beings will experience dukkha.
2. Dukkha results from ignorance of the transient nature of all phenomena, and failure to recognize the lack of any essential, permanent self.
3. There is a way out of dukkha.
4. The way out of dukkha is laid out in the Eightfold Noble Path.

One of the elements of the Eightfold Noble Path is samadhi, or meditative absorption; this practice changes ordinary fluctuations of consciousness in such a manner that the practitioner experiences a deep, clear openness and focused stability. Acting from such a state of consciousness, a practitioner may develop the insight necessary to uncouple cyclical patterns that give rise to dukkha.

Samadhi

Samadhi has been most thoroughly and precisely described in the Abhidhammic literature. The Abhidhamma is a rigorous systematization of Buddhist doctrine, in which Buddhist phenomenology is "methodically organized, minutely defined, and meticulously tabulated and classified" (Bhikkhu Bodhi, 2000, p. 2). The technical set of constructs in the Abhidhammic discussion of samadhi is especially conducive to dialogue with cognitive science. It is just the sort of material that would be useful for connecting subjective experience with neurological correlates (Varela, 1996).

Samadhi is analyzed into stages of meditative absorption called the jhanas (Nyanaponika Thera, 1976). Each jhana is defined by the presence or absence of specific phenomenological qualities, called jhana factors. The jhana factors are enumerated with their standard English translations (Shankman, 2012), and with suggestions for corresponding cognitive scientific constructs, in Table 1. Transitions between jhanas are accomplished as a practitioner drops or adds one or more of these six factors.

Table 1
Jhana factors with standard English translations and cognitive science construct equivalents

Pali Term	Standard English Translation	Cognitive Science Construct
Vitakka	Movement of the mind onto the object	Orienting attention
Vicaara	Retention of the mind on the object	Maintaining a representation in focal attention
Piiti	Joy	Somatosensory pleasure
Sukha	Happiness	Positive affect
Upekkha	Equanimity	A state where neither approach nor avoidant motivations arise because no motivational representation is highly salient and attention is diffused
Ekaggataa	One-Pointedness	Activation of an attended representation to such a relatively high, sustained degree that the representation is all that is perceived in consciousness, with all other representations deactivated (at first by inhibition, later by failure to arise)

In most accounts, there are four jhanas. Of primary importance, these stages of meditative absorption are phenomenological descriptions. In the Abhidhammic literature, the jhanas are framed, purely and simply, as states of human conscious experience. The altered states of consciousness represented by the jhanas do not themselves represent Buddhist insight, or vipassana. Rather, they are a means of inducing conscious experience that is calm, present, vivid, void of strong, disturbing emotions, and most pliable, optimized for doing the work of cultivating insight. The cultivation of insight is a separate topic, of more characteristically Buddhist religious goals than is the cultivation of samadhi, and will not be treated in this review.

In the first jhana, all six factors are present. In successive jhanas, factors are dropped as the absorption deepens. So, in the first jhana, vitakka, vicaara, piiti, sukha, and ekaggataa are present. In the second jhana only piiti , sukha, and ekaggataa are present. In the third jhana, piiti drops out and only sukha and ekaggataa remain. In the fourth jhana, only ekaggataa remains and upekkha appears (Shankman, 2012).

According to the traditional literature and practice, the jhanas are induced as follows. A monk isolates himself to an area with minimal sensory stimulation, ideally in a hut in the forest. He sits cross-legged in the lotus posture, and folds his hands into his lap. Sitting up straight but relaxed, he focuses his attention on the sensation of in-breath and out-breath on the nostrils. This mindfulness of the breath is called anapanasati. The initiation of the jhanas is marked by upacaara, most commonly translated as "access consciousness." Upacaara has occurred when the sensation of breathing has become the sole content of conscious awareness (Bhikku Ñanamoli, 2010). Once this one- pointed concentration has been attained, the monk may initiate the first jhana.

Initiation of each jhana occurs by sustained shifts in attention (Shankman, 2012). The first shift in attention is from external vigilance to the breath, until upacaara is generated. The meditator initiates the first jhana by focusing on the feeling of pleasant warmth that arises during upacaara. Proponents of enactive views of attention suggest that part of what is happening when any representation is fixated in attention is that the motor system is preparing to act on that object (Kinsbourne, 2010). Thus, stringently controlling voluntary movement may aid in broadening and diffusing attentional focus. By ceasing both to orient attention toward any specific representation (i.e. by releasing vitakka), and by ceasing to hold any specific representation in attention (i.e. by releasing vicaara), the meditator shifts from the first to the second jhana. In the transition from the second to third jhana, somatosensory pleasure, or piiti drops away. Hagerty et al. (2013), discussed further below, suggest the dropping out of piiti results from a temporary dopamine depletion following

strong release during the second jhana. Finally, in the transition from the third to fourth jhana, sukha, or positive affect, also drops away, and all that remains is equanimity and one-pointed awareness.

What patterns in the neurological substrate accompany the jhanas? Systematic alteration of conscious experience entails, after all, systematic alteration of the brain basis of consciousness. Although a 2500-year-old living tradition of Buddhist scholarship has produced highly sophisticated descriptive schemata of conscious experiences, and meditative practices for inducing them, cognitive neuroscientists have only recently begun investigating meditative absorption. The literature is, however, promising.

Suggested neural mechanism for generation of upacaara

Characteristic of upacaara, or access consciousness as the first stage of samadhi, is the disappearance of the sense of self (Bhikku Nanamoli, 2010). Some models of the neurological basis for self-representation suggest that the medial prefrontal cortex (mPFC) supports the subjective sensation of a homuncular perceiver. The "homuncular perceiver" refers to a commonly held belief regarding a dualistic division between thoughts and the person perceiving the thoughts. The "perceiver" is often termed the "Cartesian homunculus," after Descarte's cogito (Crick and Koch, 2003). The mPFC has been associated with self- relevant trait judgments (Kelley, et al., 2002; Johnson et al., 2002), autobiographical memory recall (St. Jacques, 2012), and emotional introspection (Schmitz, Kawahara-Baccus, & Johnson, 2004). In other words, the mPFC supports self-mentalization. Baars, Ramsoy, & Laureys (2003) suggest a similar model where conscious perception occurs when self-related prefrontal regions interpret representations from more posterior sensory cortex.

However, Goldberg, Harel, and Malach (2006), in contrast to Baars et al.'s (2003) and Crick and Koch's (2003) predictions, found a reciprocal relationship between activation in the mPFC and posterior somatosensory areas. Goldberg et al. (2006) presented images to participants using functional magnetic resonance imagery (fMRI). In the introspection condition, they instructed participants to think about how the image made them feel, and to click one button if it made them feel good and one if it made them feel bad. In the sensory categorization task, participants were to click one button if the image was an animal and one button if it was not an animal. The pictures were identical in both conditions. The sensory categorization task was further divided into two conditions, a fast condition and a slow condition, with the fast condition being the more challenging. During the introspection condition, participants showed preferential activation of the left mPFC, superior frontal gyrus, anterior cingulate, and paracingulate. In the introspective and slow sensory categorization tasks, they showed activation in the posterior cingulate, precuneus sulci, and inferior parietal cortex (IPC). This network largely overlaps the default mode network discovered by Raichle et al. (2001). When not engaging in goal-oriented activity, the default pattern for the people studied seemed to be to think about themselves, or to introspect. That an explicit introspective task would show preferential activation of this same network is therefore not surprising; likewise for an unchallenging sensorimotor task that leaves the mind free to wander. In the sensory categorization conditions, however, and to a greater degree in the challenging, fast condition, participants showed an inhibition of prefrontal areas and a selective activation of posterior regions associated with hierarchical visual processing, from the primary visual cortex to the lateral occipital complex (LOC), parietal, premotor, and motor areas.

There are two implications for Goldberg et al.'s (2006) study relevant to our discussion. First, conscious awareness of representations does not require a self-conscious homuncular observer, based in the mPFC, to "perceive" sensory representations in object areas of the LOC; the activation of occipitoparietal representations is sufficient for conscious awareness. No further perception by regions of the PFC are necessary. This contradicts Crick and Koch (2003) and Baars et al's (2003) suggestion that conscious perception arises from dialogue between prefrontal cortex, as the seat of the self, and sensory cortex. Self-consciousness is not necessary for conscious awareness. Second, this finding is in line with Kinsbourne's (1988) Integrated Field Theory, in which shifts in conscious awareness across the

visual field index shifts in the strength of relative activation between competing cortical subnetworks. Assuming Kinsbourne's (1988) framework, Goldberg et al's results would indicate a shift between relative activation from self-mentalizations in anterior regions toward task-oriented sensorimotor representations in posterior regions. Kinsbourne's (2006) work with hemineglect described a shift in relative strength of activation from the right to the left hemisphere and concordant neglect of the left visual field. Goldberg and colleagues' results seem to indicate a similar shift in relative strength from anterior to posterior networks during absorption in a challenging sensorimotor task, and the correlated shift from self-mentalization to consciousness of sensorimotor tasks.

Goldberg et al's (2006) findings grant some insight into why meditation practitioners report that self-mentalization seems to disappear during samadhi. Although introspection and meditation are colloquially treated as interchangeable concepts, the two activities are quite different. Anapanasati, or mindfulness of the breath, is a sensorimotor task. However, rather than emphasizing visual or auditory modalities, as in Goldberg et al's study, the target modality in anapanasati is the proprioceptive or haptic modalities. Indeed, the task of anapanasati bears more than a passing resemblance to Goldberg et al.'s sensory categorization task. In the sensory categorization task participants are presented with visual (or auditory) stimuli, and must categorize the stimuli. Alternately, in the introspective condition, participants must judge the feelings elicited by the image as pleasant or unpleasant. The sensory categorization task, then, demands attention to the sensory content and conceptual judgment. In anapanasati, the task is formally the same. The meditator must attend to the physical sensation of breath on the nostrils and upper lip, or the movements produced in the lower belly during breathing, such that this sensation occupies all her attention. She is explicitly instructed not to make a judgment about it in relation to herself, merely to let it be experienced (Bhikku Nanamoli, 2010). Goldberg et al. emphasize that the reciprocal patterns of activation between prefrontal cortex and posterior sensorimotor regions are not unimodal. Engaging tasks that utilized different sensory modalities produced the same inhibition in self-mentalizing networks. We should therefore expect that engaging, attention-demanding proprioceptive/haptic tasks will induce the same inhibition of the default mode network in PFC. Although Czikszentmihalyi (1990) has indicated that people do report losing a sense of self-consciousness during engaging physical tasks such as dance and athletics, this particular prediction awaits demonstration via neuroimaging.

The degree to which Goldberg et al.'s (2006) participants reported being absorbed in the perceptual categorization task positively predicted the amount of inhibition in the default network. This selfless absorption in a task is a common subjective experience associated with what Czikszentmihalyi (1990) calls "flow." High, occluding activation of somatosensory representations associated with breathing, along with inhibition of self-mentalization in the default mode network may thus correspond to the generation of upacaara, or access consciousness. Once this pattern of cortical dynamics has been stabilized, the meditator's phenomenological experience is one of quiet, stable, and selfless presence, and she may begin to initiate the jhanas.

The jhanas

Hagerty et al.'s (2013) experiment was the first to look specifically at the jhanas using fMRI. Their single participant, a 55-year old male, trained in the Sri Lankan tradition of Theravada Buddhism, had practiced for an estimated 17 years, accumulating approximately 6,000 hours of meditation practice. The subject was instructed to click a button to signal transition into each jhana. Based on phenomenological reports of samadhi, Hagerty et al. made five predictions:

1. Awareness of external phenomena would dim.
2. Internal verbalization would fade.
3. Sense of personal boundary would be altered.
4. The subject would demonstrate intense focus on the object of meditation.
5. There would be an increase of joy.

Consistent with their predictions, they found decreased activation compared to rest state in the visual

and auditory cortex, specifically, Brodmann's areas 17-19 and 41-42. This supported their prediction of reduced processing of visual and auditory information. They further showed decreased activation in Broca's area (BA 44, 45) and Wernicke's area (BA 39, 40), which suggested the silencing of inner speech. Areas in the parietal cortex previously associated with the brain's representation of the body's orientation in three-dimensional space (Bucci, Conley, & Gallagher, 1999) showed decreased activation during jhanas. This deafferentation of the superior posterior parietal lobe indexed an alteration of the participant's sense of bodily boundaries, and accompanied a subjective sense of consciousness without physical boundary. This finding replicated Beauregard and Paquette (2006), who also showed a deafferentation of signal from the thalamic lateral posterior nucleus to this same area of superior posterior parietal lobe in Christian monastics reporting "mystical union with God" (p. 187).

Newberg and Iverson (2003) trace this posterior parietal deafferentation to an increased release of inhibitory gamma-aminobutyric acid (GABA) onto the lateral posterior and geniculate nuclei when the reticular nucleus becomes highly activated. They speculate that this thalamic excitation and concordant inhibition of afferent sensory signals to posterior parietal cortex is brought about by increased activation in right PFC during intense, voluntary concentration, as occurs in the stages of samadhi from upacaara through the second jhana. The degree of deafferentation seems to correspond to the degree to which participants maintain a focus on a meditational object (in the case of Beauregard and Paquette's (2006) monastics, an image of their target deity), or completely release any object of focused attention, as happens when Buddhist monks release vitakka and vicaara as they transition into the second jhana. In such cases as the transition to the second jhana, deafferentation is more complete. By circumventing the ordinary process in which the parietal lobes construct the experience of a three dimensional body, this deafferentation creates an unusual conscious experience of being alert and otherwise experiencing, but no longer bound within a discrete self.

A further effect of increased GABAergic activity in the pathways from thalamus to parietal and occipital cortex during meditation is that the signal to noise ratio of sensory information is improved, resulting in a clearer signal with fewer distracting representations (Elias, Gulch, & Wilson, 2000). Newberg and Iverson (2003) draw a further link between deafferentation of the posterior parietal cortex to stimulation of the right hippocampus; there is a modulatory relationship between hippocampal and cortical activity. Stimulation of the right hippocampus spreads to stimulation of the right amygdala during meditation (Lazar, et al., 2000), and stimulation of the right lateral amygdala stimulates the ventromedial hypothalamus, activating the parasympathetic nervous system (Davis, 1992). This parasympathetic activation could explain the relaxation and deep quiescence associated with samadhi, and specifically with the factor upekkhaa, or equanimity, which appears in the fourth jhana.

Hagerty et al. (2013) further found increased relative activation in the anterior cingulate cortex (ACC) during upacaara and the first jhana, congruent with the high degree of voluntary attentional focus in those stages. However, they found a decrease relative to baseline in ACC activation during the second through fourth jhanas, again congruent with the diffusion of attention during those states as the object of meditation (the breath) is released from focal attention. Finally, Hagerty et al. found increased activation during the first and second jhana of the nucleus accumbens (NA) and medial orbitofrontal cortex (mOFC). They cite these networks as the dopamine reward systems of the human brain, which are most frequently activated in response to reinforcing environmental stimuli such as food, sex, money, and other sources of pleasure. Hagerty et al.'s subject seemed, then, to be able to stimulate endogenous dopaminergic reward in the absence of external stimuli. The experiential correlate of this heightened activation of NA and mOFC is self-reported piiti, or intense somatosensory pleasure. As the meditator dropped this piiti during the transition from the second to the third jhana, Hagerty et al. also saw a return of NA and mOFC activation to normal baseline levels.

The intense pleasure of the first and second jhanas are not the ultimate point of the practice. Rather, as Hagerty et al's (2013) subject reported, after volitional orientation toward external objects had been released during upacaara, piiti and sukha

during the first and second jhanas serve to foster a firm sense of contentment that obviates any need to approach or avoid any stimuli whatsoever. This equanimity, or upekkha, signals transition to the fourth jhana. In the fourth jhana, only equanimity and single-point awareness remain. This is the target quality of consciousness, the culmination of samadhi. There is no directing of attention, no representation held in focal attention, no pleasure and no aversion, affective contentment has dropped away, and all that remains is an alert, clear, one-pointed, equanimous awareness. It is from this state that the meditator will start the work of vipassana, or insight.

Effects of meditative absorption

Traditionally, samadhi has been one arm of practice for Buddhist monastics engaging in a religious lifestyle. Subtle, calm, pleasant states of consciousness, mastery of attention, and regulation of involuntary emotional responses are cultivated because they conduce to the real work of the Buddhist tradition, which is the overcoming of suffering by gaining insight into the sources of suffering. Despite this religious background, or perhaps as a Zeitgeist-appropriate extension of it, the "spiritual technology" of Buddhist meditation practice has been adopted by many people from non-Buddhist cultures, as both Western monastics, psychological clinicians and scientists, as well as lay people discover the value of mindfulness.

An explosion of cognitive neuroscientific research in the last ten years has examined the neurological, affective, and cognitive effects of the practice of anapanasati, or mindfulness of the breath (e.g. Bishop et al., 2004). The qualities cultivated in samadhi condition impact experience even after a practitioner is no longer in the altered state. Major efforts have been invested in adapting traditional Buddhist meditation practices to secular purposes (e.g. Baer, 2006). In previous sections, we have discussed immediate changes in neurological dynamics during the attainment of samadhi, through the stages of the jhanas. In this final section, we will discuss some of the longer-term changes in the neurological substrate and cognitive functions associated with samadhi practice. This section should serve as justification for a scientific and clinical interest in Buddhist frameworks.

Bishop et al. (2004) operationalize mindfulness as self-regulation of attention and orientation to experience. Researchers have replicated the beneficial effects of apanasati practice on cognitive function using a variety of measures. Meditators with six weeks of mindfulness practice showed improved cognitive flexibility, indexed by better performance on the Stroop task and d2-concentration and endurance test, which measures processing speed, rule compliance, and quality of performance (Moore & Malinowski, 2008). Practice for two weeks at 20 minutes per day improved participants' Graduate Record Examination (GRE) reading comprehension scores as mediated by increased working memory capacity. Participants reported this effect to be due to decrease in distracting thoughts (Mrazek, Franklin, Phillips, Baird, & Schooler, 2013). For participants in a three month meditation retreat with five hours per day of practice, MacLean et al. (2010) discovered that meditators, compared with a wait-list control group, demonstrated increased visual sensitivity, improved vigilance, increased precision of visual working memory, and improved ability to sustain attention. Positive cognitive effects may result even from relatively short interventions. Zeidan, Johnson, Diamond, David, and Goolkasian (2010) found improved performance on word association tests, symbol digit modalities tests of visual tracking and working memory, forward/backward digit span, and n-back tests, as well as a reduction in fatigue and anxiety in a meditation training group, compared to controls, after training for four days at twenty minutes per day.

Such changes in cognitive performance suggest long-term structural or functional changes in the associated neural networks, and indeed multiple groups have documented such plasticity. Lazar and colleagues (2005) assessed cortical thickness using magnetic resonance imaging (MRI) in a group of meditators in the vipassana tradition, averaging a daily practice of 40 minutes over nine years. They found increased thickness, relative to non-meditator controls, in the right middle and superior frontal sulci, right anterior insula, and occipito-temporal visual cortex, areas previously associated with attention, interoception, and sensory processing. Differences in cortical thickness were especially pronounced in the

older participants, suggesting that meditation practice can offset age-related cortical thinning. Luders, Toga, Lepore, and Gaser's (2009) participants came from several Buddhist traditions, including Japanese zazen, Tibetan samatha, and Thai, Burmese, or Sri Lankan vipassana, but all of these traditions teach and practice samadhi itself in more or less the same manner. Their participants practiced from 10 to 90 minutes daily, for 5 to 46 years. Luders, et al. (2009) found larger gray matter volume in right orbito-frontal cortex, right thalamus, and left inferior temporal gyrus, as well as much larger volumes in right hippocampus in meditators relative to controls; they link these areas to practice in emotional regulation and response control. This is to be expected given Lazar et al.'s (2000) link between the right hippocampus and parasympathetic activation mediated by the ventromedial hypothalamus; such a structural change could index a fundamental, trait-level shift in capacity for affective calm.

Conclusion

This review has attempted to correlate phenomenological descriptions of samadhi and the jhanas with what is known of the neurological correlates of such altered conscious experiences. It discussed samadhi from the perspective of Buddhist Abhidhamma scholarship, as well as recent work in cognitive psychology, cognitive neuroscience, and neuroimaging that sheds light on the neural mechanisms supporting meditative absorption. Finally, justification for research interest in such phenomena was provided by briefly sampling some of the reported cognitive, affective, and neurological effects of the practice of samadhi. This field is ripe for continued research, as the Abhidhamma provides a dense matrix of extremely precise and technical phenomenological descriptions that may provide ideal reference points for future neuroscientific inquiries into the altered states of consciousness and their applications to promoting human excellence and relief from suffering.

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Appendix

Glossary of Pali terms

Abhidhamma – a systematized body of literature organizing and tabulating phenomenological concepts from the Buddhist sutras. The *Abhidhamma* is composed of seven books, not all of which have been translated into English. Sri Lanka and Myanmar have traditionally been the centers of Abhidhammic scholarship.

Apanasati – mindfulness of the breath

Dukkha – dissatisfaction, or suffering

Ekaggataa – one-pointed attention

Jhana – a stage of meditative absorption. There are either four or nine *jhanas*, depending on the source. Each *jhana* is characterized by the presence or absence of each of the six *jhana* factors.

Pali – the language of the Buddhist cannon. *Pali* was a lingua franca in north India in the third century BCE, but is now a dead language and used only to access the Buddhist texts.

Piiti – joy, or pleasure

Samadhi – meditative absorption

Sati - mindfulness

Sukha - happiness

Theravada – form of Buddhism dominant in southeast Asia and Sri Lanka. Widely regarded as the oldest and most authentic school of Buddhism.

Upacaara – "access consciousness," where the sensation of breathing is the only object of consciousness

Upekkha - equanimity

Vicaara – retention of the mind on the object

Vitakka – movement of the mind onto the object

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New Pieces of the Jigsaw Classroom: Increasing Accountability to Reduce Social Loafing in Student Group Projects

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Generally, college student group projects can be problematic due to students perceiving low accountability and withdrawing their efforts when working within a group. This paper presents an adapted jigsaw classroom method to improve learning for college students during group work. Although the original jigsaw classroom model is an effective approach for improving cohesion and collaboration, it lacks the structure that could improve college students' collaborative learning and promote accountability. This paper extends the original jigsaw classroom approach to increase personal accountability and facilitate group processes. This paper introduces a modified jigsaw classroom, in which each group member submits research notes to the instructor, thereby increasing individual accountability, and presents to the class, thereby increasing public accountability.

Keywords: small groups, teaching, jigsaw classroom

Although group projects in the classroom are a valuable opportunity for cooperative experiential learning (Weldy & Turnipseed, 2010), students are often pessimistic of group projects (Carpenter, 2006), perhaps because of previous negative experiences. A main theme in negative group work experiences is social loafing, in which group members do not feel accountable for contributing and reduce their efforts and contributions to the group (Latane, Williams, & Harkins, 1979). Another problematic process that occurs during group work is the sucker effect. This effect refers to non-social loafing students reducing their efforts in future group projects to avoid being the "sucker" who does all of the work (Kerr, 1983). Negative group processes such as social loafing and the sucker effect are likely to occur when students believe that their individual efforts are not related to their group's performance (Karau & Williams, 1993; Sheppard, 1993). When students give minimal effort in group projects, they fail to take advantage of learning opportunities for developing collaborative skills (Freeman & Greenacre, 2011). Moreover, those students who do not engage in social loafing may feel pressured to do most of the work and make up for their peers' social loafing. When other group members are social loafing, the remaining group members may become skeptical of collaborative learning and engage in behaviors characteristic of the sucker effect (Kerr, 1983). This consequence corresponds to college students' concerns about group projects. Specifically, they are often concerned about fairness in the workload distribution and having to make up for social loafing (Walker, 2001).

Although the empirical research on the incidence of social loafing in college group work is relatively sparse, there is evidence that it occurs. For example, Aggarwal and O'Brien (2008) conducted a study with group projects in a college course where students in the groups rated the incidence of social loafing in their own group. On a scale ranging from 1 (some members didn't contribute at all) to 7 (everyone contributed equally), the mean was 3.32 (SD = 1.84), indicating that a substantial number of students perceived social loafing in their group. In a qualitative study by Colbeck, Campbell, and Bjorkland (2000), 32% of participants discussed having "slackers" in their work groups.

The problem of effort withdrawal within student work groups is unfortunate given that group work

has high potential for positive learning outcomes. Researchers have found a variety of benefits to group work at the college level. For example, group work allows learners to practice and develop the skills that are important for collaboration (Pfaff & Huddleston, 2003). In addition, group work offers more opportunities for critical thinking (Aggarwal & O'Brien, 2008) and, when groups function well, increased motivation to learn (Deeter-Schmelz, Kennedy, & Ramsey, 2002). Given these potential benefits, it is worthwhile to figure out a way to solve the problems of intentional effort withdrawal in order to maximize the benefits of group work.

The jigsaw classroom design has been used as a tool to encourage collaboration and equal distribution of effort in group work. The original jigsaw classroom divides the work by giving each student a particular component to investigate in their subgroups. Once students have gathered knowledge about their individual components of the project, they return to their home group to share their knowledge (Aronson, 2002; Aronson, Blaney, Stephan, Sikes, & Snapp, 1978). Compared to the original jigsaw classroom, the modified jigsaw design offers improved opportunities to enhance group dynamics and improve students' skills for employability (Landrum & Harrold, 2003). According to a survey of U.S. employers, the top five skills most desired in 4-year college graduates are oral communication, teamwork/collaboration, professionalism/work-ethic, written communication, and critical thinking/problem solving (Casner-Lotto & Barrington, 2006). The jigsaw classroom in its original form can help build relevant job skills by offering students the opportunity to practice their oral communication skills, teamwork skills, and critical thinking skills (Artut & Tarim, 2007; Perkins & Saris, 2001). The modified jigsaw classroom design allows students to practice skills from the original jigsaw as well as two additional skills. Students in the modified jigsaw classroom can practice their written and oral communication skills through the requirement to take notes and conduct a group presentation.

Aims of the Present Paper

In this review paper, a group project design that emphasizes individual accountability to prevent social loafing is proposed. The present paper introduces a modified jigsaw classroom design to improve the structure of group projects. The traditional jigsaw classroom design is a method of organizing student group projects, with each student serving as an expert in a particular component for their home group. Students then work with subgroups in their expert area. Finally, like a jigsaw puzzle, students return to their home groups to bring their unique component to the project (Aronson, 2002; Aronson et al., 1978). The modified design presented in this paper is intended to encourage college students' accountability. Accountability refers to each group members' responsibility for the quality of their own work in the group project (Katzenbach & Smith, 1993). According to Katzenbach & Smith (1993), there are two types of accountability: individual accountability and mutual accountability. By using the modified jigsaw design, instructors can convey to students that they each have a responsibility to contribute equally and effectively to group projects.

The Original Jigsaw Classroom

The jigsaw classroom was originally designed to increase cooperation among classmates by requiring students to share resources and work interdependently (Aronson et al., 1978). Specifically, the jigsaw classroom was rooted in the desire to increase cooperative learning in elementary school classrooms following desegregation (Aronson, 2000). The jigsaw classroom provides students with the opportunity to contribute to a common goal, which encourages cooperative collaboration across social groups and discourages competitive, dismissive behaviors (Aronson, 2000). Like pieces in a jigsaw puzzle, group members first come together to learn about a broad topic in their home groups, then separate into subgroups to develop expertise on a specific topic, and then reassemble to collaborate with their home groups. Once the group members develop expert knowledge in their respective subtopics, they are responsible for teaching their home group about the subtopic and combining their efforts (Aronson, et al., 1978).

Throughout previous field research, the jigsaw classroom has been effective for increasing group members' involvement, competence, and autonomy (Hänze & Berger, 2007). It is considered an active,

engaging teaching method that can improve students' understanding, as well as their efficiency (Perkins & Saris, 2001). In a research study comparing different methods for teaching large college classes, Carpenter (2006) assessed and compared students' reactions and performances based on the teaching method. The methods compared were: lecture, lecture/discussion combination, jigsaw, case-study, and team project. According to the results of the study, students seemed to prefer the self-directedness of the jigsaw classroom compared to other teaching methods. In addition to students' positive reactions towards the jigsaw classroom, students made the greatest improvements from pretest to posttest when the jigsaw method was used. In sum, research has found that the outcomes of the jigsaw classroom include increased learning of the material and positive reactions from both instructors and students (Artut & Tarim, 2007; Carpenter, 2006).

Weaknesses of the Original Jigsaw Classroom

Despite these advantages, the original jigsaw classroom does have weaknesses, which will be addressed with the modified design. First, the jigsaw classroom was intended for the grade school setting (Aronson et al., 1978; Zacharia, Xenofontos, & Manoli, 2010). Although the extant research includes demonstrations of the jigsaw classroom for college students (Perkins & Saris, 2001; Artut & Tarim, 2007), there is currently no review of how to apply the jigsaw classroom to this setting, especially with a specific focus on accountability and preventing social loafing.

Arut and Tarim (2007) proposed the Jigsaw II design (Kagan, 1994) for training prospective elementary school teachers. Unlike the original jigsaw classroom, students in the Jigsaw II design take a pretest on the topic, read related material, teach it to their teammates, and then take a posttest to assess group improvement. The Jigsaw II further emphasizes cooperation because it incorporates a common group goal. Students using this method put more effort into learning the material than the control group, which suggests that the jigsaw group members took responsibility for their team's success. Given that the group setting can encourage social loafing (Latane et al., 1979), Artut and Tarim's (2007) Jigsaw II encourages the promotion of individual responsibility in groups. However, this design does not provide structure during the individual learning process. Our modifications further emphasize individual responsibility by evaluating the individual note-taking that takes place before the group reconvenes.

Perkins and Saris (2001) used the jigsaw classroom to address students' learning needs in a college statistics course. Working cooperatively helped students learn from each other and share the workload of complex statistical computations. Students perceived the jigsaw classroom as beneficial and practical for the topic. Despite these advantages, the researchers did not address the social context of working in groups. Students are often reluctant to work collaboratively (Carpenter, 2006), and the interdependence of the original jigsaw classroom may not adequately change these attitudes. The modified jigsaw classroom promotes students' positive perceptions, similar to Perkins and Saris' (2001) study. By adding further structure to the original jigsaw classroom, instructors could convey that they are preventing social loafing and promoting a shared workload.

Second, the original jigsaw classroom was intended to promote cooperation and cohesion among students with diverse backgrounds (Aronson et al., 1978). This strategy encourages a classroom culture to be more collaborative and learning-oriented and less competitive. Although the jigsaw classroom emphasizes cooperation over competition, there is no existing modification that uses the cooperative component to address the lack of motivation and effort in social loafing (Aronson, 2000). Collaboration and cooperation are valuable to student group satisfaction (Chapman & Van Auken, 2001), but these aspects of group work do not include other teamwork skills that individual group members contribute for effective group work, such as planning and task completion (Stevens & Campion, 1994). The group's ability to work autonomously and direct themselves in the planning and execution of group tasks and overall goals is advantageous for group outcomes (Burdett & Hastie, 2009; Stevens & Campion, 1994). When students learn how to coordinate their efforts toward a group goal, they develop the type of collaborative skills that employers value (Landrum & Harrold, 2003). The original jigsaw classroom does not fully address these valuable processes and teach these collaborative

skills to college students (Hansen, 2006). Structured evaluation techniques (e.g., peer assessments) throughout the stages of the project, rather than only the final group outcome, are positively related to students' perceptions of planning and communication (Bailey, Barber, & Ferguson, 2015). The proposed modifications to the jigsaw classroom increase the structure and emphasize accountability. This modified design includes modifications to how the instructor evaluates group projects to emphasize accountability.

Proposed Design

Although the focus of the jigsaw technique is resource interdependence, this may not fully ensure group effectiveness (Cohen, 1994). The positive features of the original jigsaw classroom such as group members' involvement and cooperation can be modified to further emphasize these benefits. The proposed jigsaw technique could be augmented to have features that emphasize accountability, and thus promote a greater degree of group effectiveness and collaborative learning (Burdett & Hastie, 2009; Michaelsen, Fink, & Knight, 1997). This design improves on the original jigsaw classroom's emphasis on cooperation and makes the collaborative learning outcomes more relevant for college students' future careers. There are no variations on the jigsaw classroom that emphasize accountability to both students' own group members and other groups. By emphasizing accountability and interdependence in this modified design, instructors could more fully utilize the interpersonal benefits of the original jigsaw classroom. As a result, this modified design could help students learn effective collaborative processes for their professional development.

In light of these areas for improvement, the jigsaw classroom should be modified in two ways (see Table 1). First, the students will be required to take notes in their subgroups, which will then be used to assess each group member's contributions. Although students are expected to develop expertise in a specific topic during the subgroup component, the original jigsaw classroom does not explicitly require note taking (Aronson, 2000). Note taking is an opportunity for students to develop and convey their group contributions, specifically by helping students organize and recall the information when teaching their groups. For example, research has found that students learn more from notes that they have created rather than study materials that have been generated by another person (Foos, Mora, & Tkacz, 1994). According to Valtonen, Havu-Nuutinen, Dillon, and Vesisenaho (2011), when students share their notes with other students, they have the opportunity to discuss their interpretation of the content and reduce uncertainty about the information. Second, at the end of the project, each group will present its final project to the rest of the classroom, with each group member having an active role in the presentation. These additions could prevent the negative consequences associated with social loafing (Karau & Williams, 1993; Sheppard, 1993) by creating an environment in which students are accountable for their contributions (Walker & Crogan, 1998).

In the modified jigsaw classroom, accountability is emphasized by having each group member produce an individual component (i.e., notes from their subgroup). The original jigsaw classroom has students collaborate together, but it does not include an evaluation of each individual's contribution (see Table 1). This individual evaluation component creates accountability in two ways. First, it creates accountability to other group members by setting the expectation for contributions to the project and effective processes. Effective group processes are positively related to favorable attitudes about group

Table 1
Original Jigsaw with Modifications (Modifications are in italics)

- Students are members of their home groups as well as subgroups.
- *Students coordinate with their home group members to decide what information they will need to gather.*
- Students learn materials and meet with their subgroup, made up of members learning the same material.
- *In the subgroups, students take notes that will serve as a means of individual evaluation as well as a reminder when reporting to the home group.*
- Students report the material learned in the subgroup back to their home group.
- The home group works together to make a final project.
- *The home groups present their final projects to the class so that the group as a whole will be accountable, as each member must participate in the presentation.*

Note. Original Jigsaw Classroom information is from Aronson et al. (1978).

Table 2
Example Uses of the Jigsaw Classroom

Subject	Group Member Tasks	Collaborative Group Outcome
Anatomy	Learn about major muscle groups	Present how the major muscle groups work together to perform a specific physical activity
Exercise Physiology	Learn about different aspects of health, fitness, and nutrition	Create a wellness program tailored to a hypothetical person's needs
English	Learn about different works of a classic author	Create a timeline of the author's work in relation to the genre and the author's career success
Foreign Languages	Learn how to conjugate and use different tenses of a verb	Act in a skit using various conjugated forms of the verb
History	Learn about major battles in a war	Create a map of how these battles ultimately influenced the outcome of the war
Physics	Apply the scientific method to a law of physics	Plan or conduct an experiemnt that would test one of the laws of physics

projects (Bailey et al., 2015). Second, it creates accountability to the instructor by providing an explicit contribution for instructors to review. Given that it is often a challenge for instructors to teach effective group processes (Hansen, 2006), evaluating students' note taking is an opportunity to evaluate their contributions to group processes.

Requiring students to take notes also sets the expectations that each group member will contribute and be personally accountable for his/her contributions. Furthermore, requiring note taking emphasizes both the interdependence and accountability involved in the project. Interdependence in group work is comprised of three components: task interdependence, goal interdependence, and outcome interdependence (Hertel, Konradt, & Orlikowski, 2004). Respectively these components refer to working on tasks that are structured to facilitate an interactive working environment, shared goals among team members, and rewards that are relevant to all team members (Wageman, 2001). According to Hertel et al. (2004), these components of interdependence are related to positive team outcomes such as satisfaction and team effectiveness. In addition, there are clear consequences for not taking notes. If group members do not write notes on their research, then it negatively affects their grade. The note taking also encourages self-directed learning, a valued aspect of the jigsaw technique (Carpenter, 2006).

The addition of a group presentation can further emphasize accountability. The group presentations can also offer the benefit of adding a social motivation to perform well. Students' efforts would not only be visible to their group members, but also to their classmates. The need to convey knowledge creates an incentive to thoroughly prepare and contribute to the project. If group members did not adequately contribute to the project, this will be apparent to their classmates during the presentation. In addition, the presentations are an opportunity for students to learn from each other by being assigned different but related topics.

Demonstration of the Modified Jigsaw Design

For demonstrative purposes, the jigsaw design will be described as it could be used in an undergraduate psychology class, though this design could be applied to many other contexts (see Table 2 for example topics). The topics described in Table 2 would be conducive to the modified jigsaw classroom because they are areas that can easily be divided into subtopics, while still being challenging for the students. To determine the groups, students would be assigned a letter and a number. The letter corresponds to their home group and the number corresponds to their subgroup. For example, if a student was assigned "C2" the home group would be "C" and the subgroup would be "2" (see Figure 1). Home groups are the

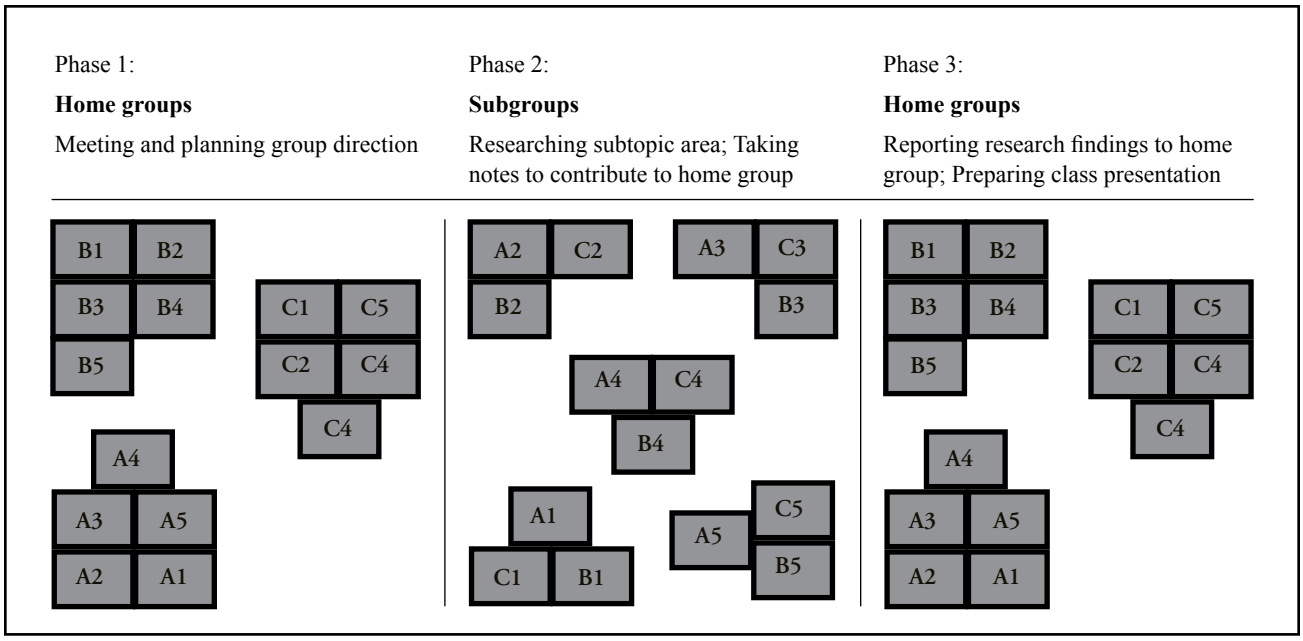

Figure 1. A demonstration of home groups and subgroups.

groups of students that work together to produce the final project. While in their subgroups, students learn about their specialty area so that they can bring that information back to their home groups.

Instruction

It may be difficult for students to understand the different phases of the jigsaw method. If students do not understand the jigsaw method, then they may revert to traditional group project methods (Zacharia et al., 2010). Therefore, it is suggested that students practice using this format with a brief task so that they can practice the three phases of the jigsaw techniques. This will help students see how the jigsaw classroom works. After becoming more accustomed to the design, students can apply the jigsaw techniques to the group project.

Learning Activity

To begin the project, students will split into their home groups to receive their assignment. For this example within a psychology class, the assignment will be to learn the different regions of the brain and deliver a presentation on how the brain functions during a particular behavior. The home group, as a whole, would be assigned a particular behavior. Then, each student in the home group would be assigned a different major region of the brain (e.g., cerebellum, parietal lobe). Therefore, when members of the home group have combined their information about the different regions of the brain, the group can explain how the brain is relevant to the assigned behavior. See the Appendix for the assignment instructions. To gather information on their assigned brain region, students will go from their home group into subgroups to learn more about their brain region. In this example, all students studying the cerebellum would work together in a subgroup, and all students studying the parietal lobe would work together, and so on. In their subgroups, students would gather information and take notes that they would later share with their home groups and turn in to the instructor. Once the students have started working in their groups, it is important to monitor their progress to determine when they should return from their subgroup to their home group. This can be a long-term process that does not necessarily have to occur only in the classroom. Students can research outside of class and the instructor can monitor progress through updates from class members.

When the students have completed their research

and notes, they will return to their home groups to teach each other what they learned in their subgroups. The activity of taking notes, sharing subgroup information, and collaborating on a presentation is intended to instill accountability and interdependence among group members (Aronson, 2000). After learning from each other within subgroups, members of the home groups will combine their information about different brain regions to create a presentation. Each of the home groups will present its findings (i.e., the brain's activity during a particular behavior) to the class.

Enhancing Positive Features of Group Work

Currently, the jigsaw classroom is an excellent format for emphasizing collaboration and common learning goals (Aronson, 2000). However, these effective interpersonal processes do not address effective collaborative processes (e.g., accountability and planning; Chapman, Meuter, Toy, & Wright, 2010). These skills are significantly related to students having positive attitudes about group projects (Bailey et al., 2015). Emphasizing accountability with the jigsaw classroom can reduce social loafing and the sucker effect in various ways. Performance of the home group depends on each person's contributions, and group members are responsible for an equal portion of the group's knowledge (Larson, 2010; Steiner, 1972). The subgroup responsibilities instill accountability to others. The subgroup process creates clear expectations on each group member's responsibilities. These modifications to the jigsaw design encourage each group member to make contributions to both home and subgroups through their emphasis of accountability.

The modified jigsaw classroom also rewards hard-working, conscientious students who may feel taken advantage of during traditional group projects (Carpenter, 2006). This design assures hard-working group members that they will be a part of only one subgroup and will not have to compensate for others' lack of effort. The original jigsaw classroom was designed to equalize contributions across group members. However, the original jigsaw classroom does not include a method for checking individual group members' contributions. In the modified jigsaw design, notes from subgroups allow the instructor to evaluate individual group members' contributions. Although each group member will be rewarded for contributing, there are also consequences for a lack of effort (i.e. lower individual grade). Each group member will be expected to give the same amount of effort, so that hard-working students will not be as likely to feel pressured to do other members' work.

The modified jigsaw classroom also benefits less conscientious students by providing a structure for effective group processes. Typically, students who are less conscientious are the social loafers in group projects (Hoon & Tan, 2008). Without the explicit expectations of note taking and a group presentation, these students may be inclined towards social loafing and a lack of contributions to group projects. This tendency to engage in social loafing can result in missed collaborative and content-related learning opportunities (Freeman, & Greenacre, 2011). Instructors can set expectations of conscientiousness and achievement for these students by using this modified jigsaw classroom design. Furthermore, the modified design's structure provides the opportunity for successful academic experiences that can set students up for positive experiences in the future.

Limitations

There are some limitations that should be considered in order to optimally use this teaching method. It is important to prevent group members from perceiving their individual contributions as dispensable, which could occur if the project is not challenging enough to require interdependent efforts. Although the original jigsaw classroom addresses the possibility that bright students may become bored during group projects, it does not address how this affects students' effort and contributions (Aronson, 2000). If the project does not consist of enough tasks for each group member to contribute, then students may be inclined towards social loafing and not contribute fairly to the note taking process. This imbalance is unfair to group members who do the majority of the work. Another important consideration when selecting the topic for the group project is the ability to easily divide a larger topic into sub-categories. This may be challenging for college-level classrooms because lessons often become increasingly complex and less easily divided among group members. This potential limitation can be addressed by carefully selecting a

topic that is appropriately divisible for this design, so that instructors can promote students' need to learn and teach one another and maximize the utility of the jigsaw classroom design (Zacharia et al., 2010).

Recommendations

To obtain maximum benefit for the modified jigsaw classroom, here are several recommendations for instructors. To ensure equal collaboration, instructors should only consider topic choices for the group project that offer a workload that can be equally divided among group members. Furthermore, instructors should emphasize that the project warrants collaboration, and that each group member's notes are a valuable contribution. A difficult project in which each group member provides necessary contributions will foster more interdependence and accountability than projects in which collective effort does not seem necessary or optimal (Cohen, 1994). Instructors should also try to put students into groups that are small enough to allow for perceptions of accountability. In his summary of how to implement the jigsaw classroom process, Aronson (2000) recommends that the home groups consist of five students each. If groups are not of equal number, then some students may have to take on roles in multiple subgroups. This could disrupt the balance of each group member's contributions and interfere with perceptions of fairness within groups.

In conclusion, this modified design builds on the advantages of the jigsaw classroom, with additional emphasis on accountability. By instilling accountability, students may be more motivated to contribute to their groups and learn collaborative skills. The modified jigsaw classroom is designed to encourage students to take responsibility for their learning and prevent social loafing. By incorporating accountability, instructors could reduce social loafing and students may have improved perceptions of group projects.

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Appendix A: Guidelines of Group Project

Group Project

Working in groups can really help us gather the information we need to see the big picture of an issue. Like pieces in a puzzle, each individual contributes an essential piece of information to the group.

Each group member will be given a letter and group number. The letter corresponds to your home group and the number corresponds to your subgroup. So if you were student "B3" for example, that would indicate that you were in home group B and subgroup 3.

Your home group's assignment is to put together a 10 minute presentation about the brain's functioning during an activity (e.g., eating, sleeping, exercising, talking, etc.). The subgroups are:

1: Frontal lobe

2: Temporal lobe

3: Parietal lobe

4: Occipital lobe

5: Cerebellum

Your home group is responsible for planning and delivering a presentation of your findings. Your "findings" will come from each person's subgroup. In your subgroups, each of you will gather information and take notes to bring back to your group about the component that you are responsible for. **Your individual performance will be evaluated on the notes you take, so be sure to make strong contributions.** Be sure to be attentive in your subgroup, it definitely relates back to helping your home group!

After your subgroups are done with their research, you will get back together with your home group. Now is the time for you and your group members to share the knowledge and expertise gained from your subgroups. Put together your notes for a slideshow presentation that includes all five parts of the brain. This presentation will need to be about 10 minutes long and will need to include contributions from each of your group members. **This slideshow is what your group will be evaluated on, which will be a part of your grade.**

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Effects of Activating Team Diversity Dimensions on Member Perceptions of Conflict, Trust, and Respect

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Research findings regarding the effects of team diversity have been mixed, as some literature suggests diversity is beneficial while other findings suggest diversity may be detrimental. The discrepancy in team diversity research findings seems to be rooted in the fact that while team diversity can at times be helpful (for tasks involving idea generation, creativity, and decision-making), diverse teams often struggle with members splitting into subgroups, which is detrimental to team functioning. Complicating our understanding of the role of diversity on team processes is the fact that diversity often exists on multiple dimensions. This study took a new approach in which faultline activation (making a team aware of differences across members) and cross-cutting diversity dimensions (composing the team in a manner that maximizes similarity across members) were studied with live interacting teams that had members of varying national origin and gender. Multilevel modeling was used to explore the effect of faultline activation and cross-cutting at the team level of analysis. When faultline activation was established by making diversity dimensions within the team apparent, team members experienced higher relationship conflict as well as lower levels of trust and respect, even when controlling for their performance on a team task. These findings suggest that an awareness of which group processes may be negatively impacted by activating faultlines is essential to ensure a positive team climate. Furthermore, the results regarding the detrimental influence of faultline activation regardless of diversity dimension composition (cross-cut or non cross-cut teams) indicate that faultline activation may have a stronger effect than cross-cutting.

Keywords: faultline theory, faultline activation, cross-cutting, cross-categorization, team diversity

The U.S.A. is becoming increasingly diverse and the workforce parallels this change (Bureau of Labor Statistics, 2014). This workforce change in combination with the increasing use of teams in organizations has made understanding the benefits and detriments of diversity in team contexts increasingly important (Salas, Weaver, Rosen, & Smith-Jentsh, 2009; van Knippenberg & Schippers, 2007). Despite the importance of understanding the impact of diversity, the research on its benefits and detriments is decidedly mixed. Some research shows that diversity causes in-group and out-group biases or us-them categorizations and therefore has a negative effect on group functioning (e.g., Chatman & Flynn, 2001). Other research has found that diversity is an asset to team outcomes because it brings about more ideas, discussion, and integration of knowledge (e.g., van Knippenberg, De Dreu, & Homan, 2004).

Complicating our understanding of the role of diversity on team processes and functioning is that diversity typically exists on multiple dimensions (Lau & Murnighan, 1998; 2005). Thus, a deeper understanding of the effects of diversity requires examining subgroups that form on several of these diversity categories instead of solely focusing on one category (e.g., gender). Further research has been focused on the effects of activating these multiple subgroup differences within teams (e.g., Pearsall, Ellis, & Evans, 2008). This activation refers to making teams aware of in-group and out-group differences (i.e., identifying diversity faultlines). There is some evidence to suggest that if differences between subgroups are not brought to the attention of members, there is less prevalence of subgroup formation (Jehn & Bezrukova, 2010; Pearsall et al., 2008). However, if made salient, this awareness may have a negative effect on team processes and outcomes. Nevertheless, much of this research has focused on a limited set of diversity variables. There is a need to examine a broader array of diversity variables,

including culture and gender, to understand how these may affect team processes differently or more strongly due to their high salience to an individual. Although demographic variables cannot take the place of psychological processes and individual differences to explain organizational outcomes (Lawrence, 1997), a team composition including both males and females as well as two different cultures can help explain the roots of relationship conflict, trust, and respect issues that occur in diverse work teams (e.g., Homan, van Knippenberg, van Kleef, & De Dreu, 2007).

Given that all teams likely present some level of diversity, it is logical to examine how multiple dimensions of diversity impact these team processes and outcomes. Some research has examined how team composition can be structured to take advantage of the multiple dimensions of diversity in a way that all members have a common category with almost every other member of the team (i.e., cross-cutting/ cross-categorization; Homan et al., 2007). This idea of cross-cutting in the context of diversity is posited to minimize in-group and out-group biases from forming within teams because team members see fewer differences between themselves and the other members (Singh, Yeoh, Lim, & Lim, 1997).

Although teams with considerable diversity (i.e., having members from several different cultures, of both genders, different job functions) are used more and more in the workplace, there is still a great need for understanding what team composition is best for successful group processes and outcomes for these teams. To examine these questions, this study uses the faultline theory (Lau & Murnighan, 1998; 2005) and cross-cutting techniques (e.g., Brewer, 2000) in an attempt to explain team processes and outcomes in teams diverse in gender and culture.

Impact of Diversity on Team Functioning

Although teams are being used in organizations with increasing frequency, there are still two conflicting views regarding the amount of value diversity holds for team processes (e.g., relationship conflict) and outcomes (e.g., performance; Williams & O'Reilly, 1998). Some research shows that diversity is an asset to team outcomes because it brings about more ideas, discussion, and integration of knowledge (e.g., van Knippenberg et al., 2004), but other research has found that team diversity causes in-group and out-group biases and therefore has a negative effect on team functioning (e.g., Chatman & Flynn, 2001). Each perspective is explained in turn and relevant research is discussed.

Information/decision making perspective. The information/decision making view argues that diversity is beneficial to team outcomes because it brings about more ideas, discussion, and integration of knowledge, which can in turn aid in team tasks (Homan et al., 2007; van Knippenberg et al., 2004; van Knippenberg & Schippers, 2007). Other researchers have found that this informational diversity also leads to more error detection, information processing, team effectiveness, and team problem solving (Gruenfeld, Mannix, Williams, & Neale, 1996; Phillips, Mannix, Neale, & Gruenfeld, 2004). Organizations often use teams because of the diverse skill set and experience they can provide in the face of the contemporary issues of the business world, such as globalization, pressures for innovation, and immensely fast-paced changes (Kozlowski & Bell, 2003; Maznevski, 1994). Overall diversity within teams can allow for the flexibility and adaptability that team reflexivity tends to initiate. Furthermore, in light of the increase in the number of global companies, organizations can benefit from the competitive advantage and an opportunity for creativity that diverse teams can provide over and beyond the use of teams in general (Watson, Kumar, & Michaelsen, 1993).

The literature involving the information/ decision-making perspective points to the idea that team diversity can be valuable for tasks involving a necessity for innovation, idea generation, creativity, and problem solving (e.g., Cox & Blake, 1991; Distefano & Maznevski, 2000), which are considered to be more challenging and difficult types of tasks. For example, Bowers, Pharmer, and Salas (2000) conducted a meta-analysis comparing the performance of teams that were homogeneous to those that were heterogeneous on personality, gender, and ability level. They found a moderating effect of task difficulty (low, medium, high) on team performance in that heterogeneous teams were moderately better (d = .53) at difficult tasks (e.g., business games) but homogeneous teams were much better at low difficulty tasks (d = .95), such as tasks involving

low stimulus certainty, processing demands, and response complexity (e.g., puzzle solving). In line with these findings, Watson et al. (1993) found that brainstorming tasks in which people must identify problems and come up with solution alternatives are better for diverse work teams as well. Having people with different perspectives and opinions can be helpful for non-routine tasks because they have more pooled knowledge, skills, and abilities available to them (van Knippenberg & Schippers, 2007).

Social categorization perspective. The social categorization perspective of diversity in teams is the opposing viewpoint to the informational/ decision making perspective. It suggests diversity causes in-group and out-group biases or us-them categorizations (Homan et al., 2007). These in turn can lead to intergroup bias resulting in prejudice against the out-group as well as in-group favoritism (Brewer, 1999). This perspective relates to social identity theory (Tajfel, 1978; Turner, 1975), which states that people organize their understanding of the world on the grounds of categorizing others into distinctly different subgroups, often demographic in nature. For example, McCann, Ostrom, Tyner, and Mitchell (1985) found that mentally sorting people into demographic categories helps us to make distinctions among others in heterogeneous teams. The in-groups in which people categorize themselves are usually quite salient and have great relevance to their identity.

Tajfel's (1978) and Turner's (1975) social identity theory also describes these categorizations as being emotionally significant. This suggests categories that we feel we belong to can hold emotional meaning for us. This theory states that subgroup categorizations are intergroup schemas that are sometimes set-up implicitly (Banaji, Hardin, & Rothman, 1993; Tajfel, 1978; Turner, 1975). Not only can these categorizations be implicit, but they also tend to occur quickly based on demographic categories (Fiske, 2000). However, the negative impact of categorizing based on demographics may be minimized over time as team members get to know one another on a deeper level (Pelled, Eisenhardt, & Xin, 1999). Individuals can determine others' likely gender, age, and race within milliseconds and tend to quickly detect if others are in-group or out-group members on these dimensions (Banaji & Hardin, 1996).

As a result of many individuals' strong identity with their in-group, it is a tendency to have more favorable attitudes and respect towards, and even preferentially treat those that are most like us within a heterogeneous team (Brewer, 1999). For example, in the context of teams, Zellmer-Bruhn, Maloney, Bhappu, and Salvador (2008) found that if team members perceive that other members are similar to themselves overall, they categorize members less on the basis of diversity dimensions made salient in the study compared to when they perceive the other members as different from themselves.

Overall, these more favorable attitudes toward the in-group lead to more trust, cooperation, and overall peaceful relations toward in-group members compared to those in the out-group (e.g., van Knippenberg & Schippers, 2007), causing more conflict in the team as a whole (between subgroups). Also, the social categorization perspective describes diverse teams as having more detrimental team processes overall, such as lower satisfaction and more conflict, that in turn leads to lower performance (e.g., Pelled et al., 1999). More specifically, Pelled et al. (1999) found that racial diversity within a team is positively associated with relationship conflict. In line with this perspective, Chatman and Flynn (2001) found that demographic diversity resulted in lower team cooperativeness, which relates to higher relationship conflict.

Faultline Theory and the Present Experiment

Regardless of the perspective that diversity is either beneficial or detrimental, research in this area has primarily focused on one diversity dimension at a time. However, when diversity exists, it rarely exists on only one dimension (Lau & Murnighan, 1998; 2005). For example, in teams people are generally diverse per gender, age, country of origin, and ethnicity. These multiple diversity categories create more than one in-group and out-group which can magnify the negative implications suggested by the social categorization perspective (Lau & Murnighan, 2005). Furthermore, subgroups formed by multiple dimensions can be stronger, meaning they result in more negative team processes and outcomes than subgroups based on only one category (Lau & Murnighan, 2005). By studying multiple facets of diversity simultaneously, it is likely that research can capture more explanatory

power regarding heterogeneous teams, including a greater understanding of team process outcomes.

Following the social categorization perspective of in-group and out-group formation within work teams, Lau and Murnighan (2005) used what they called "faultline theory" to explain in detail how and where these subgroups are created in diverse teams. They discuss how the amount of similarity and dissimilarity in a team as well as the amount of salience of the members' attributes can affect whether certain faultlines are activated, or brought to the attention of team members. Often there are more possible faultlines within a team than are actually used to form subgroups and therefore the issue of what initiates faultline activation will be discussed in more detail in the next section.

Lau and Murnighan's faultline theory (1998; 2005) states that multiple types of diversity within a team increase subgroup categorization. This can lead to more relationship conflict and lower satisfaction in teams with several diversity dimensions compared to teams without much diversity or with only one level (e.g., only differing in gender). Supporting the faultline theory, Hart and van Vugt (2006) found that when groups split off from one another due to relationship conflict, they tend to break along faultlines developed between subgroups. In addition, they found that participants anticipated that there would be more cooperation among their in-group members compared to perceived out-group members. Also, they found that once team fissions or separations did occur, the overall cooperation increased within these breakaway groups, suggesting that there was indeed more cooperation among the in-group.

Lau and Murnighan (1998) argued that the more types of diversity in a given team, the more obvious the faultline is that separates members into in-groups and out-groups. Lau and Murnighan's (1998) research provides evidence for an effect of faultline strength, meaning stronger faultlines lead to more negative group processes, such as conflict, than weaker faultlines. In later work, Lau and Murnighan (2005) found that team processes such as work communications and psychological safety (which relates to trust) were lower for groups with strong faultlines compared to groups with weak faultlines, supporting the hypothesized effects of faultline strength. Also, they found that faultlines on gender and race explained more variance than diversity in a single-attribute (e.g., just gender) for several member perceptions: team learning, psychological safety, satisfaction, and expected performance. Thus, faultline theory can help with our understanding of team processes and outcomes and therefore warrants further research.

Activating faultlines. Lau and Murnighan (1998) state that there are usually more existing faultlines in a team than are actually activated. This brings up the questions of what tends to activate faultlines and why. Research has shown that people tend to categorize others quickly and often implicitly, especially on noticeable facets of diversity such as demographics (Fiske, 2000; Tajfel, 1978; Turner, 1975). Thus, faultlines are naturally occurring hypothetical dividing lines through which a team may develop subgroups (Lau & Murnighan, 1998; 2005). Lau and Murnighan (1998) state that faultlines may stay dormant and the team may continue without splitting into subgroups on the non-activated dimension. Therefore, when differences are brought to a team's awareness (i.e., activated), it follows that subgroups are more likely to form along these faultlines.

In line with these findings, Polzer, Crisp, Jarvenpaa, and Kim (2006) found that teams of graduate students with activated faultlines based on geographic distance reported higher levels of conflict and lower trust among members than those that did not have activated faultlines. Furthermore, they found these activated faultlines were even more detrimental in regards to conflict and trust for teams that had equal distributions of members across subgroups (e.g., two members in one subgroup and two members in a second subgroup). In addition, the negative effects on these team process variables were stronger when a given subgroup included members that had a shared country of origin compared to subgroups in which members differed on country of origin.

Pearsall et al. (2008) studied the effects of gender faultline activation on team creativity through the use of an idea generation task, which was manipulated to be gender neutral or focused on only one gender. They found that activation of gender faultlines negatively affected team creativity (i.e., number and overall creativity of ideas generated), but this impact was not

present when gender faultlines were not activated. These findings suggest that the simple existence of a possible faultline within a team is not enough to trigger it to form subgroups. Instead faultlines are activated when they are task relevant, leading to detrimental team outcomes. Pearsall et al. also found that the level of conflict present when gender faultlines were activated partially mediated team creativity, meaning that teams with activated faultlines were less creative than teams without faultline activation and this was partly due to the greater amount of conflict in faultline activated teams. This finding is consistent with previous faultline research suggesting faultlines can initiate more relationship conflict, which in turn negatively impacts team performance. Jehn and Bezrukova (2010) also found that teams with activated faultlines had higher levels of team conflict, lower levels of satisfaction and team performance, and were more likely to form coalitions (i.e., two or more members that cooperate to achieve a subgroup-desired outcome rather than one that benefits the entire team) than teams with non-activated faultlines.

The present study. In the present study, faultlines were either nonactivated or activated. Activation in this study refers to making team members aware of their differences through a verbal statement about their differences or through a task that brings those differences to the forefront of members' awareness, a technique utilized in past research (e.g., Lau & Murnighan, 1998; 2005). Both types of activation were used in this study in order to make clear distinctions between activated and nonactivated conditions. Furthermore, as mentioned earlier, activation is important in that dormant faultlines may not result in the negative outcomes associated with activated faultlines.

Following the findings of relevant past research on faultline activation, it is hypothesized that there will be an effect of faultline activation, such that activation negatively impacts team processes and outcomes:

H1a) Teams in which faultlines are activated will have more relationship conflict than teams in which faultlines are not activated.
H1b) Teams in which faultlines are activated will have lower trust among members than teams in which faultlines are not activated.
H1c) Teams in which faultlines are activated will have lower respect among members than teams in which faultlines are not activated.
H1d) Teams in which faultlines are activated will have lower objective performance than teams in which faultlines are not activated.

Cross-cutting in Teams

Overall, faultline theory supports the idea that as the dimensions of diversity in a work team increases relationship conflict, damages the team climate, and lowers team performance when faultlines are activated. It seems that strong faultlines which create subgroups on more than one diversity dimension, such as teams that differ on gender, race, age, or culture, would be problematic according to faultline theory (Lau & Murnighan, 1998). This makes it difficult to determine how to use diversity to promote positive team outcomes while avoiding the team relationship conflict that can occur in diverse groups. Since Lau and Murnighan's (1998) coining of faultline theory, research has examined if there is a way to minimize these negative team outcomes, while maximizing positive outcomes.

The idea of cross-categorization or cross-cutting different levels of diversity is an attempt to reduce the negative impact of faultlines within a team by structuring teams in a way that alters members' perceptions that the group is divided by a faultline into subgroups. Cross-cutting techniques reconcile Williams and O'Reilly's (1998) two previously discussed differing perspectives on team diversity: the informational/decision-making perspective and social categorization perspective. While faultline theory supports the social categorization perspective, it focuses mostly on the negative aspects involved in team diversity due to subgroup formation. As aforementioned, the information/decision-making perspective suggests the possible benefits of diverse teams without explaining how to minimize negative implications such as conflict. Cross-cutting diversity dimensions acknowledges the fact that diversity often exists in teams as Lau and Murnighan (1998; 2005) explain in their faultline theory. However, by minimizing the possibility of subgroup formation within a team by cross-cutting dimensions of diversity, the knowledge and ideas available to diverse teams can be used.

Cross-cut teams are structured in a way that members have at least one common dimension (such as gender or race) with most other members in the team. Therefore, although a member may be considered part of the out-group in the team on one diversity dimension, they are also a member of the in-group on another dimension. In turn, this can diffuse or minimize the negative effects of social categorization within the team (Brewer, 2000) that are initiated by the faultlines that separate them into subgroups. An example of a cross-cut team on the two dimensions of race and gender is a team with one Asian female, one Asian male, one Caucasian female, and one Caucasian male. Note that cross-cutting increases similarity across diversity dimensions of race and gender in this example, but that a given individual still does not share a dimension with one other person in this team of four. This cross-cut team composition minimizes detrimental subgroup formation based on the formation of faultlines, which in turn tends to increase the social stability and tolerance within the team (Brewer, 2000). Brewer (1991) suggests that in-group bias is minimized in cross-cut teams because these multiple category memberships decrease the salience of any one specific social category to our identity. Therefore, following cross-cutting theory, teams that are cross-cut on dimensions of culture and gender, for example, should result in less intergroup bias on these dimensions because the faultlines are dissolved or broken.

There is some support for the effectiveness of cross-cutting on minimizing the perception of subgroups within a team. Deschamps and Doise (1978) were the first to link this idea to social psychological processes and found that participants perceived smaller differences among groups in the cross-cut conditions compared to the non cross-cut conditions. Therefore, this cross-cutting technique weakened their perceptions of in-groups and out-groups based on faultlines. Furthermore, Marcus-Newhall, Miller, Holtz, and Brewer (1993) examined the effects of cross-cutting using bogus feedback by telling participants they were either over-estimators or under-estimators on a dot estimation task. They cross-cut the type of estimator category with a bogus feedback category about which type of expert they were in the team: either cognitive experts or emotional experts on a specific task. They found that participants in the cross-cut condition perceived higher similarity among their team members than those in the non cross-cut condition. Furthermore, they found that subgroup formation was eliminated in cross-cut groups, whereas teams that were not cross-cut showed significant subgroup formation based on the assigned categories. Cross-cutting has also been found to minimize in-group bias within a team based on year in college (e.g., sophomores vs. freshmen; Rust, 1996) and political party (e.g., Republican vs. Democrat; Bettencourt & Dorr, 1998). Both Rust (1996) and Bettencourt and Dorr (1998) found results consistent with Marcus-Newhall et al.'s (1993) finding that the significant bias between in-group and out-group categories was eliminated when groups were cross-cut on two different dimensions.

Not only has cross-cutting dimensions of diversity been shown to lessen subgroup formation, but it seems to improve team processes as well. In an unpublished study by Homan and van Knippenberg (2003), it was found that cross-cutting leads to more favorable team processes than equally dividing along a faultline (as cited in van Knippenberg & Schippers, 2007). Also, Homan et al. (2007) studied cross-cutting within four-person teams on the dimensions of gender, informational diversity, and bogus personality feedback. It was found that participants in conditions with subgroups created by faultlines were less satisfied, had a more negative team climate, and had more relationship conflict unless they were cross-cut by informational diversity. The team climate variable refers to the extent to which teams feel psychological safety (related to trust) within the team, indicating that individuals in cross-cut teams were likely to feel more trust with the other members of the team than individuals in non cross-cut teams.

The present study. In the present study, culture and gender are the diversity variables of interest in cross-cutting. Culture was selected because it is closely linked with values and attitudes (whereas race and ethnicity are not in all cases), which are important aspects of one's identity (Maznevski, 1994) through which members of a team often categorize each other (Fiske, 2000; Tajfel, 1978; Turner, 1975). Gender was selected because it is often an important part of individuals' views of themselves in regards to their

own identity (Pearsall et al., 2008).

Following the findings of relevant past research on cross-cutting, it was hypothesized that there would be an effect of cross-cutting, in that teams with cross-cut diversity dimensions will have more positive effects on team processes and outcomes than those without cross-cut dimensions:

H2a) Teams that are cross-cut on gender and culture will have less relationship conflict than teams that are not cross-cut on these dimensions.
H2b) Teams that are cross-cut on gender and culture will have higher trust among members than teams that are not cross-cut on these dimensions.
H2c) Teams that are cross-cut on gender and culture will have higher respect among members than teams that are not cross-cut on these dimensions.
H2d) Teams that are cross-cut on gender and culture will have higher objective performance than teams that are not cross-cut on these dimensions.

Interaction of Cross-cutting and Faultline Activation

Although there are no studies that have examined cross-cutting and faultline activation within the same team, past findings regarding faultline strength and the effects of cross-cutting suggest a possible interaction. First, Lau and Murnighan's (1998/2005) research differentiates between strong and weak faultlines. They explained that strong faultlines are separated by more than one diversity dimension while weak faultlines are separated by only one dimension. Furthermore, research on cross-cutting (Bettencourt & Dorr, 1998; Brewer, 1991, 2000; Homan & van Knippenberg, 2003; Homan et al., 2007; Marcus-Newhall et al., 1993) shows that by its nature, this technique minimizes strong faultlines by creating teams with only one person per category (e.g., one U.S. born Caucasian female, one U.S. born Caucasian male, one Chinese female, and one Chinese male). Therefore, all members have only weak faultlines between themselves and most other people in the team (e.g., they each share either the same gender or culture with all but one team member). Past findings indicate that weak faultlines result in much less negative team processes and outcomes than strong faultlines (Bezrukova et al., 2009; Lau & Murnighan, 1998, 2005). Therefore, diverse teams (on dimensions of gender and culture) which have been found to be negatively affected by faultline activation, may be less detrimentally affected when teams are not cross-cut. It is therefore logical that an interaction may exist between faultline activation and cross-cutting as indicated below:

H3a) There is an interaction for faultline activation and cross-cutting, such that teams with activated faultlines that are not cross-cut on gender and culture will report more relationship conflict than all other conditions.
H3b) There is an interaction for faultline activation and cross-cutting, such that teams with activated faultlines that are not cross-cut on gender and culture will report less trust than all other conditions.
H3c) There is an interaction for faultline activation and cross-cutting, such that teams with activated faultlines that are not cross-cut on gender and culture will report less respect than all other conditions.
H3d) There is an interaction for faultline activation and cross-cutting, such that teams with activated faultlines that are not cross-cut on gender and culture will have lower objective performance than all other conditions.

Within the context of composing diverse work teams, gender and culture are common aspects of diversity in present times when there are increases in the number of women and foreign-born individuals in the workforce (Bureau of Labor Statistics, 2013), in addition to the climate of globalization and international changes. However, there is surprisingly little research looking at both culture and gender within the same study and understanding if cross-cutting can ameliorate the negative impact of activated faultlines for team process and dynamics.

The present study examines the impact of faultlines and cross-cutting on the diversity dimensions of gender

and culture on team processes and outcomes. To our knowledge, there is no research that conjointly takes into account both gender and culture when studying the effects of faultline activation and cross-cutting on live interacting teams. To examine these questions, we employed an experimental simulation study in which participants interacted in groups on a creativity task. The team process variables of relationship conflict, trust, and respect, as well as the outcome variable of team performance on the task were measured. The team process data was analyzed using Hierarchical Linear Modeling (HLM6; a multilevel modeling program created by Raudenbush & Bryk, 2002). Multilevel modeling is the appropriate analysis to use in team contexts due to the fact that individuals are inherently nested within the team. Process variables (e.g., trust, respect, conflict) within a team are more similar than between teams because team processes most likely have a similar effect on all members due to their shared group environment. Because aspects of a team's environment are shared across members, member perceptions about their team experience (including perceptions of conflict, trust, and liking) are usually more similar than are perceptions of members across different teams. This must be taken into account statistically. Multilevel modeling allows for an understanding of both the variation across teams and the variation within teams (Rindskopf, 2010). Previous research has not taken this analytical approach to study faultlines or cross-cutting in teams.

Method

Participants

Participants were 212 undergraduate students from introductory psychology and management courses from a large Northeastern college. Participants received credit for their participation in the experiment. Half the participants were female and half were male as required by the design of the study. Culture was operationalized as a combination of ethnicity and national origin. Ethnicity was controlled within culture so that it was not confounded with this diversity dimension and also in order to make the cultural difference more salient. In this study, we included Caucasian participants whose national origin was the U.S.A. and Asian participants whose national origin was China. These countries were selected because they have been found to be quite divergent on multiple cultural dimensions (House, Hanges, Javidan, Dorfman, & Gupta, 2004). Half the participants were Asian and born in China while the other half were Caucasian and born in the U.S.A. The age range of participants was 18-50 years (M = 21.4, SD = 3.68). In total, there were 53 four-person teams. Participants signed up for the study through an online recruitment system specifically for students at that college.

Design

The experiment consisted of a 2 (cross-cut on nationality and gender vs. not cross-cut on nationality and gender) x 2 (faultline activation vs. no faultline activation) factorial design. Sessions were randomly assigned to one of the four experimental conditions (cross-cut/faultline activation, cross-cut/no faultline activation, not cross-cut/faultline activation, not cross-cut/no faultline activation).

Creating cross-cut vs. not cross-cut teams. To create cross-cut teams on gender and culture, the team composition on both of these diversity dimensions was manipulated. Sessions were randomly assigned to either a cross-cut condition or a non cross-cut condition. In the cross-cut teams, four-person teams were created, consisting of the following: one female member who shared her cultural background (either born in the U.S. or in China) with only one male team member, but not the other female; the other female and male member shared a cultural background that was different from the first male and female members' backgrounds. An example of a cross-cut team was one that included one U.S. born Caucasian female, one U.S. born Caucasian male, one female born in China, and one male born in China.

To create teams that are not cross-cut on these dimensions, four-person teams without cross-cut compositions on gender or culture were created. An example of a team that is not cross-cut had two U.S. born Caucasian females and two males born in China. In addition, in the teams that are not cross-cut, the members that shared the same gender and culture were seated next to each other to make the faultline even more salient and noticeable, following the procedures of Homan et al.'s (2007) study.

Faultline activation. Sessions were randomly

assigned to either the activation or non-activation conditions. According to Lau and Murnighan (1998), demographic characteristics are the most easily noticed when a new team forms and therefore faultlines often occur along these types of characteristics. Therefore, faultlines based on gender and culture are likely to develop early and conflict may arise quite quickly within teams upon their formation (Lau & Murnighan, 2005), and studying these processes within laboratory-formed teams within a short timeframe is reasonable. However, according to Lau and Murnighan (1998) and Pearsall et al. (2008), faultlines may remain dormant unless something triggers them to divide along subgroups. Therefore, faultines were activated in two ways: by making teams aware of their differences in gender and culture and activating faultlines through the task, following the procedures of Pearsall et al.'s (2008) study.

Verbal activation. In the activated conditions, the researcher stated to the teams that individuals in their team were very different in respect to gender and culture. In addition, each member had to tell their team their country of birth to make it obvious to everyone on the team. In the non-activation conditions, the participants were not told anything about their similarities or differences nor did they have to tell each other their country of birth.

Task activation. Faultlines in the activation conditions were also made task relevant, as research suggests is necessary to create the potential of subgroup formation (Lau & Murnighan 1998, 2005; Oakes, Haslam, & Turner, 1994; Pearsall et al., 2008; Turner, Hogg, Oakes, Reicher, & Wettherell, 1987). A commonly used creative idea generation task (e.g., Friedman & Forster, 2001; Goncalo & Staw, 2006) was used across teams, though the specifics of the task varied by the experimental condition. Teams in the activated faultline conditions were given a picture of a men's razor and as a team they had to think of as many ideas as they could to market this product in 15 minutes. They had to decide as a team whether an idea should go on the list, and after this task they had to come to a consensus as a team to order their ideas from what they considered to be their best idea to their worst idea in five minutes. They were told to discuss each strategy in turn before coming to a consensus as a team on the order. Following the Pearsall et al. (2008) study procedures, the team had to specifically market the razor to only males in China. Teams in the non-activation conditions completed the same tasks, but they used a gender neutral product instead (e.g., an alarm clock marketed to both genders and to consumers both in the U.S. and China).

Procedure

Upon arrival, participants were welcomed to the experiment and told they would be participating in a study on group tasks. Participants were given a consent form to read and sign. Next, all the four-person teams completed a common team decision-making survival task in which they had ten minutes to rank the order of importance of a list of items in a hypothetical plane crash. This allowed more time for participants to work together as a team, which is more realistic as teams are usually together for more than 20 minutes. Also, this was a way to have all teams become somewhat comfortable with the structure of the tasks. Next, all the four-person teams completed a variation of a commonly used creative idea generation task mentioned earlier. Both the idea generation task and the ordering task were used based on past research that has shown these are the types of high cognitive level tasks for which diverse teams can be beneficial (Bowers et al., 2000; Cox & Blake, 1991; Distefano & Maznevski, 2000; Sawyer, Houlette, & Yeagley, 2006; Watson et al., 1993). After these two tasks, participants individually completed questionnaires regarding their attitudes towards various aspects of their team's functioning, which included all of the dependent measures. Next, participants completed a demographics questionnaire. Participants were then debriefed, given credit, and were free to leave.

Measures

The main dependent variables were relationship conflict, trust, and respect as well as objective team performance. Each measure except objective performance was rated by participants on a 5-point Likert scale with anchors of 1 (strongly disagree) to 5 (strongly agree). Objective performance was coded by the number of the ideas a given team came up with. Cronbach's alpha was used to determine

internal reliability estimates for the scores on each dependent variable except objective performance, as these variables were each measured with at least two items. The internal consistency of the scores was acceptable for all these measures as noted below.

Team relationship conflict. This variable was measured using modified versions of relationship conflict questions from the Intragroup Conflict Scale (Jehn, 1995). The five relationship conflict items are "There was relationship tension in my work group," "There was personality conflict in my work group," "People seemed to get angry while working in my group," "There was friction among members in my work group," and "There was emotional conflict in my work group." A composite team relationship conflict score was created by averaging the scores of the five relationship conflict items (α = .85). All conflict items were reverse scored such that higher scores signified less conflict.

Trust and respect. Trust and respect have been shown to be important team process variables (e.g., Jehn & Mannix, 2001; Kozlowski & Bell, 2003; Kozlowski & Ilgen, 2006). Higher scores for these items indicate higher levels of trust and respect. All these items are from a study by Jehn and Mannix (2001). Trust was measured with two items: "I trusted my fellow group members" and "My group members were truthful and honest." Respect was also measured with two items: "I respect my fellow group members" and "I respect the ideas of the people in my group." Both trust and respect demonstrated sufficient internal consistency (α = .74 and α = .86, respectively).

Objective team performance. The number of non-repetitious marketing strategies generated by the team was the measure of objective performance, following Pearsall et al. (2008). The decision-making task of rank ordering their strategies was not a factor included in the objective team performance. Two raters that were blind to the experimental conditions rated performance. When raters' decisions were not identical, a third rater made the final decision. Raters were instructed to count the number of uniquely separate ideas on a given team's list. As the teams were instructed to generate ideas within the context of advertising, design of the product, and/or features of the product, all of these types of ideas were valid and included in the total count. In order to be counted, the ideas had to be specified to the degree that it could be understood what the marketing technique was. For example, if the team wrote "color" on the list, it was not included in the number of ideas because it could not be known what exactly was meant by this. However, if the team wrote "make the product available in three different colors," this would be counted as one idea.

In addition to using objective performance as an outcome, performance was controlled for in the analyses of the team process variables. This is because it would often be obvious to teams whether they performed well or not on the tasks, which in turn could affect how they rated their team members regardless of their perceptions of relationship conflict, respect, and trust.

Demographics. Gender and national origin of participants were known prior to the study, as participants signed up ahead of time online in separate slots (one for U.S. born females, one for U.S. born males, one for Chinese females, and one for Chinese males) to ensure their eligibility for the study. After the study, these questions were asked again in a demographic survey along with participants' age, major, gender, country of birth, years they have lived in the U.S., native language, perceived fluency in English, and year in college. Finally, there was an additional question probing for suspicion to discover if participants guessed the nature of the study. However, no participants guessed the true nature of the hypotheses or true purpose of the study.

Coding Independent Variables

The independent variables were dummy-coded such that for faultline activation, conditions that were activated were coded as 1, while conditions that were not activated were coded as 0. For cross-cutting, conditions where teams were cross-cut on diversity dimensions of national origin and gender were coded as 0, while conditions where teams were not cross-cut were coded as 1.

Results

Descriptive Statistics

Descriptive statistics and correlations were

examined for all process dependent variables. Correlations between relationship conflict, trust, and respect were all statistically significant at the $p < .01$ level at both the individual level and the team level. Table 1 presents the means, standard deviations, and inter-correlations for all three dependent variables at the individual level, while Table 2 includes the means, standard deviations, and inter-correlations for all three dependent variables and objective performance at the team level.

Table 1
Means, Standard Deviations, and Intercorrelations at Individual Level

Variable	M	SD	1	2
1. Relationship Conflict	4.31	.62		
2. Trust	4.09	.63	.36**	
3. Respect	4.27	.59	.33**	.69**

**$p < .01$

Tests of Hypotheses

Given the nested structure of the data, multilevel modeling was used for this study. To determine if cross-cutting and activation had effects at the group level of analysis, multilevel modeling was performed for each dependent process variable (Hypothesis 1a-c, Hypothesis 2a-c, and Hypotheses 3a-c) while controlling for the team objective performance on the idea generation task. In nested data situations, the assumption of independence of observation cannot be ensured due to the relationships that exist among the individuals that are nested within the same team (Hofmann, 1997; Raudenbush & Bryk, 2002). Relationship conflict, trust, and respect within a team will innately be more similar than between teams because team processes most likely have a similar effect on all members due to this shared environment. Multilevel modeling is a technique that statistically accounts for this possible similarity based on a group-level variable and allows for an understanding of both the variation across teams and the variation within teams.

Three sets of analyses were done at the group level to test whether teams systematically differ as a function of the team-level characteristics (i.e., faultline activation and cross-cutting diversity dimensions). The first two sets of analyses were to determine if there were main effects of activation and cross-cutting on the process variables and the third set was to determine whether an interaction was present. For all three statistical models, separate analyses for each process dependent variable (e.g., relationship conflict, trust, and respect) were conducted and objective performance was controlled for at level 2. Variables were not mean-centered in the analyses and the coefficients from the multilevel analysis results reported in Tables 3, 4, and 5 are unstandardized.

Table 2
Means, Standard Deviations, and Intercorrelations at Team Level

Variable	M	SD	1	2	3
1. Relationship Conflict	4.31	.30			
2. Trust	4.09	.34	.47**		
3. Respect	4.27	.33	.50**	.78**	
4. Objective Performance	13.08	5.01	.05	-.06	.02

**$p < .01$

In this study, the individual level variables are participants' scores for the process dependent variables. γ_{ij} in the level 1 equation below represents the individual score of a specific participant in the study. β_{oj} is the mean level of the dependent variable for the jth individual (group mean) and r_{ij} is the level 1 residual which shows the variance not accounted for within individual scores.

$$\gamma_{ij} = \beta_{oj} + r_{ij}$$
$$\beta_{oj} = \gamma_{00} + \mu_0$$

For the second part of this set of equations for the level 1 model above, γ_{00} is the grand mean across all teams. Therefore, the group mean is a function of the sum of the grand mean and the between group variance (μ_0) or residual. Before this study's hypotheses could be tested, there must be variation among the group means. In this case, μ_0 would be significant, which indeed was found.

Hypotheses 1a-c were tested by predicting the group means on the dependent variables (β_{oj}) as a

Table 3
Faultline Activation Multilevel Analyses at Team Level (Controlling for Performance)

Variable	Coefficient (γ_{01})	SE	*p*
1. Relationship Conflict	.15	.09	.09
2. Trust	.17	.09	.09
3. Respect	.17	.09	.06

Note. Faultline activation conditions were coded as 1, no faultline activation as 0.

Table 4
Cross-cutting Multilevel Analyses at Team Level (Controlling for Performance)

Variable	Coefficient (γ_{01})	SE	*p*
1. Relationship Conflict	-.08	.09	.38
2. Trust	.04	.10	.66
3. Respect	-.06	.09	.55

Note. Non cross-cut conditions were coded as 1, cross-cut as 0.

Table 5
Multilevel Analyses for Cross-cutting and Faultline Activation Interaction at Team Level (Controlling for Performance)

Variable	Coefficient (γ_{01})	SE	*p*
1. Relationship Conflict	.06	.17	.71
2. Trust	.07	.19	.72
3. Respect	.11	.18	.54

function of the whether or not the team's faultlines were activated. Therefore, activation is included in the model at this step to test whether there is a main effect of faultline activation, as seen in the below equation.

$$\beta_{oj} = \gamma_{00} + \gamma_{01}\,(ACTIVATION) + (PERFORMANCE) + \mu_0$$

Hypotheses 2a-c were tested by adding cross-cutting to the model as shown in the below equation.

$$\beta_{oj} = \gamma_{00} + \gamma_{01}\,(CROSSCUT) + (PERFORMANCE) + \mu_0$$

Furthermore, Hypotheses 3a-c were tested by adding in the interaction to the level 2 model as seen in the below equation.

$$\beta_{oj} = \gamma_{00} + \gamma_{01}\,(ACTIVATION) + \gamma_{02}\,(CROSSCUT) + \gamma_{03}\,(INTERACTION) + (PERFORMANCE) + \mu_0$$

Main effect of activation. For Hypothesis 1a, relationship conflict was entered at level 1 with faultline activation in level 2. Results did not quite reach traditional statistical significance levels (p = .09). Therefore, though relationship conflict was higher for teams that had faultline activation, as predicted, the relationship did reach statistical significance. Subsequently, trust and respect were each entered in turn at level 1 while keeping activation in the level 2 equation. Results were approaching significance for both trust and respect as well (p = .08 and p = .06, respectively), thus some support was also found for Hypotheses 1b and 1c. The results of these analyses are summarized in Table 3.

Main effect of cross-cutting. For Hypothesis 2a-c, relationship conflict, trust, and respect were each in turn entered into the level 1 equation with (non) cross-cutting in the level 2 equation. Results were not statistically significant (relationship conflict, p = .38; trust, p = .66; respect, p =.55), showing no support for Hypothesis 2a-c and suggesting no support for a main effect of cross-cutting regardless of whether faultlines were activated or not. The results of these analyses are summarized in Table 4.

Interaction of faultline activation and cross-cutting. The same process that was used to test the previous hypotheses was repeated for testing Hypotheses 3a-c by including relationship conflict, trust, and respect each in turn at level 1 while putting activation, cross-cutting, and an interaction term of these two in at level 2. None of the results were statistically significant, leading to no support for Hypotheses 3a-c (relationship conflict, p = .71; trust, p = .72; respect, p = .54). The results of these analyses are summarized in Table 5.

Objective performance. Hypotheses 1d and 2d refer to the predictions for main effects of activation and cross-cutting on objective performance. These were tested using univariate ANOVAs with the data aggregated to the group level, as this variable was

only at the team level. The effect of activation on performance was not statistically significant, $F(1, 49) = .80$, $p = .38$, $\eta^2 = .14$, providing no support for Hypothesis 1d. The effect of cross-cutting on performance was also not statistically significant, $F(1, 49) = .79$, $p = .38$, $\eta^2 = .14$, resulting in no support for Hypothesis 2d. Hypothesis 3d predicted an interaction between cross-cutting and activation for performance and was also tested using a univariate ANOVA with the data aggregated to the group level. However, results were not statistically significant; $F(1, 49) = .01$, $p = .92$, $\eta^2 = .05$.

Discussion

The purpose of the present study was to study the effects of cross-cutting and faultline activation on team process variables and performance. The effects were studied in several novel ways. First, cross-cutting strategies have rarely been done on naturally occurring dimensions but instead have often been studied through the use of bogus feedback to create subgroups within a team (e.g., Marcus-Newhall et al., 1993). Studying naturally occurring dimensions, such as culture and gender, is a necessary avenue to pursue because of their salience to our social identity (Tajfel, 1978; Turner, 1975; 1985). Past research also indicates that we categorize others very quickly and often without conscious control (Fiske, 2000). The few studies that have cross-cut on naturally occurring categories have been limited to political affiliation (Bettencourt & Dorr, 1998) and year in college (Rust, 1996). Secondly, the present study is the first that includes both cross-cutting and faultline activation within the same study design. Third, this study implements multilevel analyses to understand the team level effects on various dependent process variables, which is the appropriate method to use, though not always utilized in past cross-cutting research.

In this study, faultline activation led to marginally more relationship conflict, less trust, and less respect among teams than conditions in which faultlines were not activated, which occurred regardless of the cross-cutting condition. Given that our findings did not meet the traditional criterion for statistical significance, there are two potential interpretations of the results.

First, if these results were not significant because there truly are no differences in these process variables due to faultline activation, then activating these faultlines may not actually impact conflict, trust, or respect perceptions to an important extent for teams diverse in culture and gender. Additionally, no other existing studies included both cross-cutting and faultline activation techniques. Therefore this study is the first to allow for a comparison between the effectiveness of each on minimizing negative team processes. Furthermore, no past studies examining the potential effects of cross-cutting have utilized multilevel analyses, though more recent research has stated that this is the appropriate way to analyze such data (e.g., Rindskopf, 2010). It is possible that the studies that found cross-cutting to be beneficial for improving performance and team processes would have yielded different or even nonsignificant findings if these studies would have utilized multilevel analyses, which is more appropriate than the analyses typically conducted (e.g., *t*-tests, ANOVAs). Therefore, it may be important to re-analyze data provided from these studies with multilevel modeling to understand if the findings would still be significant. Additionally, it will be critical for future researchers to use multilevel modeling for team research topics where both individual level and team level relationships are of interest, which is the case for both cross-cutting and faultline research.

Second, if these results (which were approaching significance) were simply underpowered due to sample size or impacted by variables other than our intended manipulations, the implication is that potentially activated faultlines within a team may be too strong to be overcome by cross-cutting techniques, at least in the context used in this study. For example, if members of teams already knew each other from previous or current classes taken together, this could affect the findings in an unexpected manner such that the manipulations of cross-cutting and faultline activation could have less of an impact. Questions regarding team members' familiarity with one another were not asked in this study, but should be asked in future research. Additionally, it is possible that the manner in which cross-cutting and faultline activation were each manipulated were not strong enough to differentially impact the teams' perceptions and, in

turn, team processes. Though this study used similar methodology as previous related studies to manipulate these conditions, participants in this study live in New York City, a culturally-diverse location. Thus, perhaps participants' perceptions were less focused on ingroup and outgroup formation based on culture-related diversity than others' would be. If the same manipulations were done in more homogenous cities, perhaps the findings would differ. In line with this, much of the past work on cross-cutting was done in fairly homogenous settings (e.g., the Netherlands). If this is the case, the amount of diversity one is exposed to on a daily basis may create a boundary condition for the effects of cross-cutting and cultural faultline activation. Though cross-cutting was expected to ameliorate the negative impact of faultline activation, this study did not find support for this expectation.

However, neither cross-cutting nor faultline activation affected objective performance. Therefore, in this study, faultline activation had a marginally detrimental effect on team climate (conflict, trust, respect), but not on the actual team performance. Yet previous findings suggest that when diversity dimensions are related to the specific task participants are required to do, and the members' differences are made explicit prior to the task, team experiences can be negatively impacted. This indicates teams will likely work less cohesively in these situations and will probably enjoy the working relationships less than teams whose differences are not made obvious. Clearly, more research must be done in this domain to determine if these relationships exist and, if so, to determine how robust they are.

Future Research

As with any study, this study has several potential limitations. First, the teams in this study met only once and for the duration of just one hour. Although this is a step in the right direction towards generalizability to actual interacting teams, results could potentially vary depending upon the amount of time teams have to interact. Second, in this study we operationalized culture as a combination of national origin and ethnicity, though within a given country it is likely that various individuals hold different cultural beliefs or values regardless of ethnicity. Third, faultlines could have been inadvertently activated in cross-cut conditions due to the possibility that participants' may have still created subgroups based on one demographic dimension (e.g., gender), regardless of the second demographic dimension (e.g., culture) cross-cutting this. If a given participant identified more with their culture or more with their gender, perhaps cross-cutting did not impact the team functioning as has been found in past research, which may explain the lack of effect of cross-cutting in this study.

For future research, studies should examine if cross-cutting could minimize negative impacts of team diversity in the work domain, as this has never been done with a sample of employees. Faultline processes should also be examined in the work context as many organizations may unknowingly activate particular faultlines within diversity training, though this research is yet to be carried out. It would also be informative to study actual working teams in an organization that may differ on common dimensions such as job function and tenure in addition to studies specifically looking at cross-cutting effects on culture and gender in this environment.

Regardless of whether future studies are conducted with student or employee samples, it may be worthwhile to look at differential subgroup perceptions within a team. The current study did not do so being that participants were specifically asked to answer questions in relation to their perceptions of the team as a whole, but not perceptions of specific members in their team. It is possible that members of a given diversity dimension (e.g., females) may feel higher satisfaction, perceive less relationship conflict, etc. with other females regardless of culture. The current study made the task important or relevant to the gender as well as the cultural dimension to avoid this. However, it would be interesting to study whether one dimension such as gender is more salient than others when given a task that is not directly relevant to these dimensions.

Conclusion

It is pertinent to continue studying diverse team processes as van Knippenberg and Schippers (2007) strongly suggest. We must move this research into different realms, such as actual workplace teams, and with various other diversity dimensions that have

too often been overlooked (e.g., sexual identity, job function, tenure on the job). It is essential to respect the complexity of team diversity research and continue striving to implement several complimentary or even contradictory theories into the same research design to improve our understanding of the processes involved in diverse teams. In addition, although the present study's predicted positive effect of cross-cutting in diverse teams was not found, cross-cutting should be examined in future studies to determine if it could have the predicted positive impact in other contexts.

Furthermore, the necessity for the implementation of the most appropriate statistical analyses for the given theoretical questions asked is essential. In team research, multilevel modeling is often the most appropriate procedure for identifying the effects of team level manipulations. Future research is encouraged to use these statistical methods as well. Lastly, although it is not the most simple nor by far the quickest manner in which to do research, involving salient identities such as culture and gender into team studies is worthwhile not only due to the scarcity in which this is done, but also because of the sheer importance of these dimensions to many people's identities.

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Clinical Trainees' Personal History of Suicidality and the Effects on Attitudes Towards Suicidal Patients

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Up to half of all individuals who completed suicide were in treatment at the time of death. Clinicians are thus uniquely positioned to help avert suicidal behavior, and the attitude of treating clinicians can greatly affect the quality of care of suicidal individuals. The goal of this study was to gain a preliminary understanding of how clinicians' own personal histories may impact their interactions with and attitudes towards suicidal patients. A questionnaire was distributed to clinical psychology trainees attending a voluntary 2-day workshop on working with suicidal crises. Questions assessed history of suicidality in self or close others, history of working with suicidal patients, attitudes towards suicidal patients, and attitudes towards preparedness and willingness to work with this population. Of 44 participants, 73% personally knew somebody who was suicidal, 59% had themselves experienced suicidal ideation, and 5% had an actual plan. Personal experiences with suicide were associated with increased stigmatizing attitudes, while specific education appeared to mitigate these negative feelings. Preliminary evidence is provided that indicates high levels of personal suicidal experiences in clinical trainees' histories which directly affect attitudes towards patients. It is suggested that specific education may increase students' preparedness and comfort in working with this vulnerable clinical population.

According to the National Center for Health Statistics, suicide is the second leading cause of death among adults aged 25 to 34 years in the United States (Nock, 2012). Additionally, the rates of suicide among Americans aged 35 to 64 increased by almost 30% between 1999 to 2010 (Centers for Disease Control and Prevention, 2013). Considering that more than 31,000 patients per year die from suicide while currently in treatment (up to half of all suicides; Fawcett, 1999; Hoyert, Heron, Murphy, & Kung, 2006), and that higher levels of involvement with mental health services is associated with a greater risk of completed suicide (Hjorthoj, Madsen, Agerbo, & Nordentoft, 2014), it is important for clinicians to have a better understanding of the variables that may impact treatment of suicidal patients. This includes clinicians' general attitudes towards and willingness to work with individuals who are suicidal.

The attitude of clinicians can greatly affect the quality of care of patients at risk of suicide (Sethi & Uppal, 2006). Whether it be unresolved issues from the clinician's past being triggered or realistic reactions to the patient's behaviors, the reactions of clinicians towards patients may result in feelings of incompetence, hopelessness, demoralization, hostility, and/or withdrawal from emotional involvement with the client (McIntyre & Schwartz, 1998). This may set up a cycle of negative emotions and interactions between patient and clinician, resulting in unsuccessful and counterproductive treatment. Patients have much worse outcomes when they are treated by professionals who have pessimistic and discriminatory attitudes (Jorm, Korten, Jacomb, Christensen, & Henderson, 1999), and may have increased rates of self-harm and suicidal behavior (Hemmings, 1999). Focusing on the clinician's bias and attitude does not negate the effects of a patient's personality and maladaptive coping on outcomes. At the same time, it helps to develop a greater understanding of how therapist-related factors may operate within the treatment and, thus, impact outcomes.

Mental health professionals are more likely to have negative and stigmatizing attitudes towards mental illness and suicidal behavior than the general population (Henderson et al., 2014; Hugo, 2001; Jorm et al., 1999). This may be due to the mental health education system (Aydin, Yigit, Inandi, & Kirpinar, 2003; Nordt, Rossler, & Lauber, 2006), as well as the increased focus on biological defects rather than

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attribution of meaning (Read & Law, 1999). There is also some evidence that attitudes are likely to be shaped by clinicians' personal history with mental illness and suicide.

For instance, those who have experienced a patient's suicide are more likely to hospitalize suicidal patients, treat these patients with greater caution, and experience avoidance of or reluctance to treat depressed and/or suicidal patients in the future (Gulfi, Castelli Dransart, Heeb, & Gutjahr, 2010; Spiegelman & Werth, 2005). In addition, therapists surviving the death of a patient, especially therapists in training, often feel alone, unsupported, unprepared, ashamed, guilty, angry, and fearful of sharing their experience with supervisors and/or administrators (Grad & Michel, 2005; Spiegelman & Werth, 2005). However, the impact on clinicians is largely due to their own personal characteristics and previous life experiences (Alexander, Klein, Gray, & Eagles, 2000).

If clinicians' attitudes are largely shaped by personality and life experience, then it is plausible that students entering graduate training already manifest many of the perspectives that will shape their interactions with patients. It is important to understand, then, how education can affect change in any negative biases that might be shaped by one's personal experiences to help guide trainees to work effectively with vulnerable populations. While previous life experiences likely have the greatest impact on clinicians' attitudes and behaviors towards suicidal patients, studies examining clinicians' experiences with mental illness and suicide are limited and appear to be non-existent with regards to those in postgraduate training.

In a review of the few articles available, Kleespies et al. (2011) suggest that there appears to be evidence that the risk of suicide for psychologists is actually higher than the general population, as well as other similarly educated groups (e.g., Fussell & Bonney, 1990). A survey conducted in 1994 of 800 psychologists revealed that at least 61% had experienced clinical depression, 29% had felt suicidal at some point in their life, and 4% had actually attempted suicide (Pope & Tabachnick, 1994). These numbers have not improved in recent years; a survey of 1000 counseling psychologists conducted by Gilroy, Carroll, and Murra (2002) found that 62% were currently depressed, and 42% had experienced suicidal ideation and/or behaviors. More disturbingly, it was found that 14% of those who were suicidal did not tell anybody, including their own therapist. This may not be surprising when it has been found that subjects consider depression in the therapist as a "personal flaw" that is not permitted (Deutsch, 1985, p. 312). In fact, Wood, Klein, Cross, Lammers, and Elliott (1985) found that only 55% of practitioners who responded that their depression affected their work actually sought help.

It is not surprising that psychologists may be more vulnerable to depression and suicide than the general population. Childhood trauma, maternal depression, and number of negative life events are common risk factors for depressive symptoms and suicidal ideation (Konick & Gutierrez, 2005; Wilcox et al., 2010). When compared with individuals of other professions, psychotherapists have been found to have a greater prevalence of childhood trauma and emotional neglect (Fussell & Bonney, 1990). Difficult experiences in one's family is thought to be particularly significant in an individual pursuing psychotherapy as a career, in that such a career choice might satisfy unmet needs (Strupp, 1973). Therapists are commonly thought of as 'wounded healers'; a concept that acknowledges the high rates of difficult life experiences individuals attracted to such a field have often faced (de Vries & Valadez, 2005).

Although it appears as though rates of experiences with suicide may not be uncommon in mental health professionals, there do not appear to be many empirical studies looking at how this personal history may affect attitudes. A study of non-mental health care professionals working in an emergency room in India concluded that internal conflicts over one's own suicidal proneness, in part, is positively correlated with avoidance of empathic closeness to suicidal patients, blaming of these patients and accusations of manipulation, and other negative attitudes that resulted in a low quality of care for these individuals (Sethi & Uppal, 2006). The lack of help-seeking in mental health professionals who are depressed (e.g., Wood et al., 1985) suggests that there is possibly a great deal of shame associated with one's own perceived weaknesses. In an account of her own struggle with mental illness, Sawyer (2011),

an esteemed psychologist at Yale University, states that the "prejudice that makes clinicians deny their own past or present need for psychotherapy affects our patients too" (p. 787). She urges professionals to open up communication about their own vulnerability and to not deny how personal experience can affect the treatment of patients. The effects of these personal struggles on the treatment of patients is not empirically known, but when looked at in the context of the previous studies cited, mental health professionals likely would have greater biases and more negative attitudes towards clients presenting with similar problems as themselves.

The following exploratory study used a researcher designed self-report questionnaire to gather information on rates of personal history of suicidal ideation, personal experiences of knowing individuals who were suicidal, and experiences working with suicidal patients for students attending a doctoral program in clinical psychology. Further, data were gathered on level of anxiety in working with suicidal patients, attitudes towards suicidal individuals, stigma associated with diagnosis, and willingness to work with patients who are suicidal. Personal history variables were examined relative to attitudes towards working with suicidal patients in their mental health career. It is hoped that this exploratory study can provide preliminary evidence for the rates of personal histories of suicidality, attitudes towards working with suicidal individuals, and any effects specific training might have on these attitudes among clinical psychology trainees.

Methods

Participants

A total of 52 participants attending the same clinical psychology doctoral program in the Northeastern United States attended the workshop. Of those, 44 (85%) completed the anonymous survey. Subjects from each of the first four years of the program participated; first year = 6 (14%), second year = 14 (32%), third year = 13 (30%), fourth year = 8 (18%), and no answer = 3 (7%). Participants were predominately female ($N = 31$; 71%). No other demographic information was requested due to the sensitive nature of gathering personal data on students who were in the company of faculty and peers. At the time of the study, the age range of graduate students was 21-60, but an age variable was not collected due to the identifying nature of those few individuals with an age older than 30.

Measures

A 20-item questionnaire was constructed to obtain information regarding history of suicidality in self or close others, history of working with suicidal patients, and attitudes towards suicidal patients. The focus of the questionnaire was developed based on literature that provided evidence that, among clinicians, there is a prevalent view of suicidal patients as being manipulative and a burden on resources (Deans & Meocevic, 2006; Swain & Domino, 1985). This is particularly the case among clinical trainees (Jorm et al., 1999). Further, there is some evidence of an increase in negative attitudes based on personal history of suicidal ideation (Sethi & Uppal, 2006) or having experienced a patient's suicide (Gulfi et al., 2010; Spiegelman & Werth, 2005). Additional questions were developed using reformatted questions borrowing from The Mental Illness Clinicians' Attitudes Scale (MICA; Chronbach's alpha = .79; Kassam, Glozier, Leese, Henderson, & Thornicroft, 2010). The questionnaire developed was specific to students attending an elective two-day workshop offered by the graduate clinical psychology program, and was not validated or standardized. Many of these students were likely to have also attended a semester-long course focused on treatment of chronically suicidal and emotionally dysregulated patients, and questions were added in order to consider this variable. The full questionnaire is included in the appendix.

Procedures

The questionnaire was distributed to students attending a two-day workshop on working with suicidal patients, which was provided by senior faculty. This voluntary workshop consisted of educational components that explained the motivations of chronically suicidal individuals, taught procedures and techniques for assessment, and described interventions used during crisis situations.

Students were informed that it was an anonymous survey, no identifying information was requested, and participation was completely voluntary. Institutional Review Board approval was obtained for both the pilot and reported studies. Answers to the questionnaires were entered into SPSS (version 18). All data was analyzed using *t*-test and ANOVA calculations, and no violations of normativity were found.

Results

Of the 44 participants who completed the questionnaire, 26 (59%) had completed the previous course on specific treatment for chronically suicidal patients. Twenty-three participants (52%) had previous experience working with a suicidal patient, six (14%) had a patient threaten suicide, four (9%) had a patient attempt suicide, and two (5%) had a patient who completed suicide. Only 12 (27%) of the students had not known someone personally who was suicidal. Two (5%) had known somebody who had a specific plan, 12 (27%) knew somebody who threatened suicide, seven (16%) knew somebody who attempted suicide, and 11 (25%) knew somebody who completed suicide. The reported relationships of those who were personally known to be suicidal were: a family member (N = 11; 25%), a friend (N = 12; 27%), an acquaintance (N = 4; 9%), and a close other (N = 3; 7%).

Only 18 (41%) participants reported never having experienced any suicidal ideation themselves. Seven (16%) reported "maybe" having felt suicidal, 16 (36%) reported having only thought about it, and two (5%) reported having a specific plan. Participants reported being willing to tell a therapist if he or she was suicidal (M = 4.27, SD = .95, with 1 = "strongly agree" to never tell a therapist and 5 = "strongly disagree" on a 5-point Likert scale), but were mostly unwilling to tell a peer (M = 2.98, SD = 1.09, using the same 5-point Likert scale). Due to the disparity of balance between genders among this small sample, possible gender differences on the various measures were not considered informative and so are not reported here. Table 1 describes the frequency of suicidal experiences.

Although there was a small sample of participants, several significant differences did emerge. Table 2 describes the results of comparing attitudes towards and anxiety related to working with suicidal patients. Not all questions were answered by all participants. Twenty-six participants (59%) had received prior training on specific treatment for chronically suicidal patients. Those who received this previous training were significantly more likely than those who did not (N = 18) to believe they had the adequate tools to treat suicidal patients, $t(42) = 2.55$, $p < .05$, and to have more comfort in working with suicidal patients compared to others, $t(42) = 2.53$, $p < .05$. After the 2-day workshop, participants had significantly more comfort in working with suicidal patients, $t(49) = 2.45$, $p < .05$, and were significantly more likely to believe they had adequate tools to work with suicidal patients, $t(49) = 3.48$, $p < .01$.

Those participants who had experienced any form of suicidal ideation (N = 22) were significantly more likely than those who did not to consider diagnosis as a reason for characterizing an individual as manipulative, frustrating, and/or selfish, $t(39) = 2.22$, $p < .05$. Similarly, those who did not have the previous course were also significantly more

Table 1
Students' rates of experiences with suicide.

	N (%)
Have you ever had a patient who was suicidal?	
Yes, they completed	2 (5)
Yes, they attempted	7 (17)
Yes, they threatened	2 (5)
Yes, they had a plan	4 (10)
No	27 (64)
Have you ever personally known somebody who was suicidal?	
Yes, they completed	15 (36)
Yes, they attempted	8 (19)
Yes, they threatened	7 (17)
Yes, they had a plan	1 (2)
No	11 (26)
Have you ever felt suicidal?	
Yes, I have attempted	0
Yes, I have had a plan	2 (5)
Yes, I have only thought about it	14 (33)
Maybe	6 (14)
No	19 (45)

Table 2

Comparison of attitudes towards and anxiety related to working with suicidal patients between those with and without prior training and between those who have experienced suicidal ideation and those who have not.

	Previous Training				Suicidal Ideation			
	With		Without		Personal experience		No	
	M	SD	M	SD	M	SD	M	SD
Adequate tools to treat suicidal patients[a]	3.19	.94	3.94*	.99	2.59	.91	2.37	.68
Comfort compared to other patients[a]	3.31	1.05	4.00*	.59	3.23	.97	3.32	.95
Would diagnosis influence attitudes?[a]	3.31	1.29	2.56*	.92	3.05	1.13	3.74*	.81

a = answers are based on a Likert scale (1 = *Completely*, 5 = *Not at all*); *p < .05.

likely than those who had to consider individuals as manipulative, frustrating, and/or selfish based on diagnosis, $t(42) = 2.13$, $p < .05$. There was also a significant interaction effect between suicidal ideation and having had previous training on endorsement of suicidal patients as manipulative, $F(1) = 4.10$, $p < .05$, suggesting that education may mitigate the negative effects of personal suicidal ideation.

Discussion

The results of this exploratory study appear to provide preliminary evidence for high rates of suicidality among mental health professionals in training, high frequency of having personal experiences with suicidal individuals, and possible negative effects of such experiences on attitudes towards suicidal patients. On a questionnaire that was given, during a program-sponsored workshop with faculty in attendance, 59% of participants reported having possibly felt suicidal at some point in their life, and 5% reported having had an actual plan; however, due to the nature of an in-person questionnaire given in front of faculty and peers, this may be an underestimate of the prevalence of suicidal ideation among trainees. According to their self-report, those trainees who did experience suicidal ideation were more likely to stigmatize suicidal individuals using diagnosis, possibly in an effort to differentiate suicidal individuals who are legitimately described according to stereotype and one's self. They also appeared to have more negative attitudes overall, although this was not significant. Additionally, many of the participants were ambivalent towards or unwilling to tell a peer if they were suicidal, suggesting that there might be shame associated with personal suicidality.

Almost three-fourths (73%) of participants reported having known someone in their personal life who was suicidal, and 25% knew someone who completed suicide, most of whom were either family members or friends. Having known somebody who was suicidal is likely to have multiple effects; some may be more likely to avoid and stigmatize suicidal patients while others may be more empathic and more willing to work with suicidal patients. These tendencies may not be evident in this statistical analysis, but may be an area in which qualitative research could provide a better understanding.

Although there is some evidence that experiences with suicidal ideation is high among mental health professionals (e.g., Gilroy et al., 2002), there is only minimal empirical investigation of how clinician's personal history with suicide may affect attitudes towards suicidal patients. Previous studies have found some evidence that professionals working with suicidal patients may have increased pejorative and dismissing attitudes when they have a personal experience with suicide (Gulfi et al., 2010; Sethi & Uppal, 2006; Spiegelman & Werth, 2005). Unconscious projections of hatred and envy may be directed towards patients when a clinician has his or her own suicidal tendencies (Twemlow, 1997). These negative attitudes also tend to lead to worse outcomes (Jorm et al., 1999), including increased rates of

self-harm and suicidal behavior among patients (Hemmings, 1999).

Clinicians' personal histories can be associated with biases and avoidance when treating a patient with a similar history to one's self (Little & Hamby, 1999). Attempting to conceal and avoid painful experiences may impede emotional healing (Brewin, Dalgleish, & Joseph, 1996) and lead to shame (Platt & Freyd, 2012), externalization of blame, anger, hostility, and resentment (Sethi & Uppal, 2006; Tangney, Wagner, Fletcher, & Gramzow, 1992). It is hoped that this study may decrease some of that shame by reporting the high rates at which clinicians appear to experience suicidal ideation.

This study had several limitations. The sample size was small and consisted of a group of students attending the same program. The results may not be generalizable to students in other regions or of other disciplines, and also may not be descriptive of professionals once they begin their careers. A study comparing professionals' attitudes and experiences to those of trainees would help clarify how one's biases and behaviors change over time. The participants were all attendees at a voluntary workshop for working with suicidal individuals; those choosing to attend such a workshop could be more likely to have personal reasons for doing so. Future studies looking at effects of educational programs might benefit from comparing individuals who do and do not attend such programs to see if they differ on personal histories. The questionnaire was a self-report measure and may not accurately reflect the extent to which individuals have personally painful experiences or negative attitudes towards vulnerable individuals, particularly since it was given in front of other peers and faculty and the researcher personally knew many of the participants. The difficulty in obtaining information regarding professionals and trainees' personal histories may be a reason for the limited number of studies in this area. Further, this study was exploratory, attempting to contribute preliminary data for further research that is incredibly lacking, yet desperately needed. Lastly, the questionnaire used was not standardized or evaluated for construct validity or reliability. Future studies may use the findings of this exploration to create an instrument that is validated and standardized for greater accuracy and precision.

Although there is a high frequency of suicidal experiences among clinicians, it appears that education focused on a non-judgmental approach to working with suicidal individuals may buffer some of the negative effects these experiences might have. Several recent articles have emphasized the need for greater education of trainees both in understanding suicidal behavior and the need for dealing with one's own experiences (Kleespies et al., 2011; Rudd, Cukrowicz, & Bryan, 2008; Sawyer, 2011; Schoener, 1999; Sethi & Uppal, 2006). It is suggested that awareness of the effect of trainees' personal experiences on the treatment of patients (Kleespies, 1993), as well as the need for a greater understanding of patients' subjective experience are imperative in order to reduce stigma, bias, negative attitudes, poor quality of care, and resentment towards suicidal individuals (Kleespies et al., 2011; Sethi & Uppal, 2006; Spiegelman & Werth, 2005). The phenomenon of potential patient suicide and the effects of personal experience should be addressed during training in order to safeguard against some of the negative feelings and attitudes, as well as to increase awareness of one's own vulnerability to mental health issues (Middleton, 2008; Spiegelman & Werth, 2005).

Although further research needs to be conducted, the results of this study do suggest that personal experiences with suicide, both with self and other, may not be an uncommon phenomenon in individuals pursuing a career in the mental health field. Future studies should focus on larger populations, clinicians as well as trainees, the use of validated measures, and a control group to determine the level of effect of the educational process. Education may play a key role in mitigating any negative effects that one's personal history may have, and may increase student's preparedness and comfort in working with this vulnerable clinical population. Therefore, developing more focused educational programs that address clinicians' personal history and the impact on attitudes towards clients, as well as on teaching less stigmatizing approaches to working with this vulnerable population, are important directions for educators.

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Appendix

1. What year are you
   a. First year b. Second year c. Third year
   d. Fourth year e. Fifth year
2. Gender
   a. Male b. Female
3. Did you take the DBT course offered in the Fall of 2012?
   a. Yes b. No
4. Have you ever worked with a suicidal patient?
   a. Yes b. No
5. Do you feel comfortable working with a suicidal patient?
   a. Completely b. Mostly c. Somewhat
   d. A little e. Not at all
6. Do you experience fear and/or anxiety in regards to working with a suicidal patient?
   a. Completely b. Mostly c. Somewhat
   d. A little e. Not at all
7. Do you believe that you have the adequate tools necessary to assess and treat a suicidal patient?
   a. Completely b. Mostly c. Somewhat
   d. A little e. Not at all
8. Have you ever had a patient attempt or commit suicide?
   a. Yes, they completed b. Yes, they attempted
   c. Yes, they threatened
   d. Yes, they had a plan e. No
9. Have you ever personally known somebody who was suicidal?
   a. Yes, they completed b. Yes, they attempted
   c. Yes, they threatened
   d. Yes, they had a plan e. No
10. If you answered yes to the previous question, was the person _____?
    a. An acquaintance b. A friend c. Family member d. Close other e. N/A
11. Have you ever felt suicidal?
    a. Yes, I have attempted
    b. Yes, I have made a plan
    c. Yes, I have only thought about it
    d. Maybe e. No
12. Are you currently in therapy?
    a. Yes b. No
13. If I were suicidal I would never tell a therapist
    a. Strongly agree b. Agree c. Somewhat agree
    d. Somewhat disagree e. Strongly disagree
14. If I were suicidal, I would never admit it to my peers for fear of being treated differently
    a. Strongly agree b. Agree c. Somewhat agree
    d. Somewhat disagree e. Strongly disagree
15. People who are suicidal can never recover enough to have a good quality of life
    a. Strongly agree b. Agree c. Somewhat agree
    d. Somewhat disagree e. Strongly disagree
16. People who are suicidal are manipulative
    a. Strongly agree b. Agree c. Somewhat agree
    d. Somewhat disagree e. Strongly disagree
17. People who are suicidal are frustrating
    a. Strongly agree b. Agree c. Somewhat agree
    d. Somewhat disagree e. Strongly disagree
18. People who are suicidal are selfish
    a. Strongly agree b. Agree c. Somewhat agree
    d. Somewhat disagree e. Strongly disagree
19. Would the patient's diagnosis influence your answers to the previous questions?
    a. Definitely b. Slightly c. Maybe d. Not really
    e. Not at all
20. I feel as comfortable working with a person who is suicidal as I do a person with any other mental illness.
    a. Strongly agree b. Agree c. Somewhat agree
    d. Somewhat disagree e. Strongly disagree

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